

SARDAR PATEL COLLEGE OF ENGINEERING



6/7/22

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

End Semester Examinations: June 2022,

Duration: 3 Hours

Maximum Points: 100

Course Name: Structural Mechanics

Semester: IV

1. Attempt any FIVE questions out of SEVEN questions.

2. Answers to all sub questions should be grouped together.

3. Figures to the right indicate full marks.

Program: B.Tech. in Civil Engineering

Course Code: PC-BTC402

4. Assume suitable data if necessary and state the same clearly.

Q.No.	Questions	Points	CO	BL	Pľ
Q.1(a)	A 20 m high masonry dam of trapezoidal cross section ABCD has the top and bottom widths of 3m and 10m respectively as shown in figure below. The dam retains water on its vertical face to a depth of 20 m. Determine the maximum and minimum stresses developed at the base of the dam. The unit weight of masonry is 22 kN/m ³ and that of water is 10 kN/m ³ .	10	1	4	1.1.1 1.3.1 2.4.1
	20 m				
Q.1(b)	A simply supported beam of span 10 m, is subjected to a central point load of 70 kN at an angle of 30° with Y axis as shown in figure below. The cross section of the beam is a rectangle of width 250 mm and depth 500 mm. (i) Find the maximum bending moment and state its location. Show this moment vector in the cross section. (ii) Find the location of the neutral axis and show it in the cross section. Find the maximum and minimum bending stresses and state their location in the cross section.	10	1	4	1.1.1 1.3.1 2.4.1
(0)	500 mm 250 mm				And the state of t



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Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examinations: June 2022

Q.2(a)	Write the expression for strain energy stored in a member due to	05	2	2	1.3.
	(i) Shear force (ii) Twisting Moment	-	(2) =+7	+	-
	Explain the terms involved in each expression		4	2	
Q.2(b)	For the frame loaded as shown in figure below	15	2	3,4	1.3.
	a) Find the support reactions	1		1	2.1.
	b) Draw AFD, SFD & BMD		1		
	80 KN 2m				
	4m 8 kKN/m				
Q.3(a)	Find the slope and vertical deflection at the free end C for the beam	10	3	3,4	1.3.1
	supported and loaded as shown in figure below. <u>Use conjugate method</u> only.			3,4	2.1.
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				
).3(b)	Find the slope and vertical deflection at C for the beam supported and loaded as shown in figure below. <u>Use moment area method only.</u>	10	3	3,4	1.3.1 2.1.3
	60 kN 25 kN/m	×			
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				
				, ,	

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

End Semester Examinations: June 2022

or the pin jointed frame loaded as shown in figure below, find the orizontal deflection of joint E. B C E 40 kN 4 m T T T T T T T T T T T T T T T T T T	8	3	3,4	1.3.1 2.1.3
4 m 4 m 4 m 4 m 4 m 4 m 4 m 4 m	8	3	3,4	
ame loaded as shown in figure below. 30 kN/m B 5 m	8	3	3,4	
B 5 m C				
A M				
sing <u>Macaulay's method only,</u> find the slope and vertical deflection at for the beam supported and loaded as shown in figure below.	10	3	3,4	1.1.1 1.3.1 2.4.1
80 kN 20 kN/m B C V V V V V V D 3 m 4 m 3 m				2,71
nd the strain energy stored <u>due to bending moment only</u> for the beam aded as shown in the figure below.	10	2	3,4	1.1.1 1.3.1 2.4.1
30 kN 60 kN B				
n	B C 3 m 4 m 3 m d the strain energy stored due to bending moment only for the beam ded as shown in the figure below.	B CVVVVVVV D 3 m 4 m 3 m d the strain energy stored due to bending moment only for the beam ded as shown in the figure below. 30 kN 60 kN B	B CVVVVVVV D 3 m d the strain energy stored due to bending moment only for the beam ded as shown in the figure below. 30 kN 60 kN B	B CVVVVVVVD D 3 m 4 m 3 m d the strain energy stored due to bending moment only for the beam log led as shown in the figure below. 30 kN 60 kN B



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End Semester Examinations: June 2022

Q.6(a)	For the frame loaded as shown in figure below	10	4	3,4	1.1.1
	a) Find the support reactions b) Draw AFD, SFD & BMD for members AB and BC only	tine cal	1 3.11		2.4.1
	B 4m C				
	4m 2m → 12 kN		-		
	A D				
Q.6(b)	Find the crippling loads using (i) Euler's and (ii) Rankine's formulae- for a steel column 3.0 m long with both ends hinged. The cross section of the column is a symmetrical I section with the following dimensions. Top and bottom Flange width = 250 mm,	10	4	3,4	1.1.1 1.3.1 2.4.1
	Top and bottom Flange thickness = 25 mm, Depth of web = 300 mm, Thickness of web = 30 mm. Take E = 2x10 ⁵ N/mm ² , f _c = 350 MPa and Rankine's constant = 1/7000.				
Q.7(a)	(i) Name the methods of finding deflection in trusses.	02	3	2	1.3.
	(ii) State and explain Bette's theorem.	05	2	2	1.3.
	(iii) Nam the factors which determine the Euler's buckling load of a member subjected to an axial force?	03	4	2	1.3.
Q.7(b)	Locate the principal axes and find the principal moments of inertia for the angle section shown in figure below.	10	1	3,4	1.1. 1.3. 2.4.
	10 mm 90 mm	m ş			
	50 mm	120 120	***		
	10 mm				





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

End Semester Examinations: May 2022

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Program: B.Tech. in Civil Engineering

Course Code: PC-BTC402

Course Name: Structural Mechanics

Duration: 3 Hours

Maximum Points: 100

Semester: IV

1. Attempt any FIVE questions out of SEVEN questions.

Answers to all sub questions should be grouped together. 2.

3. Figures to the right indicate full marks.

Assume suitable data if necessary and state the same clearly. 4.

Q.No.	Questions	Points	CO	BL	ΡI
Q.1(a)	A cylindrical steel chimney of 45 meters height and 2 meters external diameter and 0.8 meter internal diameter is exposed to a horizontal wind pressure, the intensity of which varies as the square root of the height above the ground. At a height of 25 m, the intensity of wind pressure on a flat surface is 2.5 kN/m² and the co-efficient of wind resistance is 0.62. Calculate the maximum and minimum stress intensities at the base. The density of steel is 78.5 kN/m³.	10	1	4	1.1.1 1.3.1 2.4.1
Q.1(b)	A rectangular cross section of width 250 mm and depth 450 mm is subjected to a bending moment of 50 kN-m at 60 degrees to the positive X axis as shown in the figure below. Find the location of the neutral axis and show it in the cross section. Find the maximum and minimum bending stresses and state their location in the cross section.	10	1	4	1.1.1 1.3.1 2.4.1
	450 mm Cross section				
Q.2(a)	Write the expression for strain energy stored in a member due to (i) Axial force (ii) Bending Moment Explain the terms involved in each expression	05	2	2	1.3.1





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Q.2(b)	For the frame loaded as shown in figure below a) Find the support reactions b) Draw AFD, SFD & BMD	15	2	3,4	1.3.1 2.1.3
	80kN B 3m				
Q.3(a)	Find the slope and vertical deflection at the free end B for the beam supported and loaded as shown in figure below. <u>Use conjugate method only</u> .	10	3	3,4	1.3.1 2.1.3
	10 kN A B B B				
	Find the slope and vertical deflection at C for the beam supported and loaded as shown in figure below. <u>Use moment area method only.</u>	10	3	3,4	1.3.1 2.1.3
	70 kN 50 kN A				





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Q.4(a)	For the pin jointed frame loaded as shown in figure below, find the vertical deflection of joint A.	10	3	3,4	1.3.1
	4 m B 3 m D 5 m				
Q.4(b)	Determine the horizontal deflection of point D of the rigid jointed frame loaded as shown in figure below.	10	3	3,4	1.3.1 2.1.3
	B C 4m 20 kN/m				
	Using Macaulay's method only, find the slope and vertical deflection at D for the beam supported and loaded as shown in figure below.	10	3	3,4	1.1.1 1.3.1 2.4.1
	60 KN 40 KN A				;
Q.5(b)	Find the strain energy stored <u>due to bending moment only</u> for the beam loaded as shown in the figure below.	10	2	3,4	1.1.1 1.3.1 2.4.1
	50 kN 10 kN/m A				





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

0.6(a)	For the frame leaded as shown in Course heles	10	14	124	111
Q.6(a)	For the frame loaded as shown in figure below	10	4	3,4	1.1.1
	a) Find the support reactions				2.4.1
	b) Draw AFD, SFD & BMD for member CD only 60 kN			-	ļ
	B 3m 3m C				
	A 4 m D				
Q.6(b)	Compare the crippling loads given by Euler's and Rankine's formulae for a steel column 4.0 m long with both ends fixed. The	10	4	3,4	1.1.1 1.3.1 2.4.1
	cross section of the column is a symmetrical I section with the following dimensions. Top and bottom Flange width = 300 mm,				
	Top and bottom Flange thickness = 20 mm,				
	Depth of web = 400 mm, Thickness of web = 40 mm.				
	Take $E = 2x10^5 \text{ N/mm}^2$, $f_c = 350 \text{ MPa}$ and Rankine's constant = $1/7000$.				
Q.7(a)				 	
	(i) Name the methods of finding deflection in structures.	03	3	2	1.3.1
	(ii) State and explain Maxwell's reciprocal theorem.	04	2	2	1.3.1
	(iii) What are the limitations of Euler's formula for buckling load	03	4	2	1.3.1
	of a column?				
~ #41					
Q.7(b)	Locate the principal axes and find the principal moments of inertia for the angle section shown in figure below.	10	1	3,4	1.1.1 1.3.1 2.4.1
	250 mm 250 mm 20 mm 20 mm				



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

End Semester Examinations: May 2022

1011) Lem IV

Program: B.Tech. in Civil Engineering

Duration: 3 Hours

Course Code: PC-BTC402

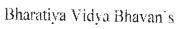
Maximum Points: 100

Course Name: Structural Mechanics

Semester: IV

- 1. Attempt any FIVE questions out of SEVEN questions.
- 2. Answers to all sub questions should be grouped together.
- 3. Figures to the right indicate full marks.
- 4. Assume suitable data if necessary and state the same clearly.

Q.No.	Questions	Points	СО	BL	PI
Q.1(a)	A cylindrical steel chimney of 45 meters height and 2 meters external diameter and 0.8 meter internal diameter is exposed to a horizontal wind pressure, the intensity of which varies as the square root of the height above the ground. At a height of 25 m, the intensity of wind pressure on a flat surface is 2.5 kN/m² and the co-efficient of wind resistance is 0.62. Calculate the maximum and minimum stress intensities at the base. The density of steel is 78.5 kN/m³.	10	1	4	1.1.1 1.3.1 2.4.1
Q.1(b)	A rectangular cross section of width 250 mm and depth 450 mm is subjected to a bending moment of 50 kN-m at 60 degrees to the positive X axis as shown in the figure below. Find the location of the neutral axis and show it in the cross section. Find the maximum and minimum bending stresses and state their location in the cross section.	10	1	4	1.1.1 1.3.1 2.4.1
	450 mm 250 mm Cross section				
Q.2(a)	Write the expression for strain energy stored in a member due to (i) Axial force (ii) Bending Moment Explain the terms involved in each expression	05	2	2	1.3.1





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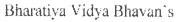
Q.2(b)	The same of the state of the st	15	2	3,4	1.3.
	a) Find the support reactions		İ		2.1.3
	b) Draw AFD, SFD & BMD				
	80kN				
	$B 3m \downarrow 3m$				
	C Sm V Sm C		ĺ		
	 				
	15 kN/m 3				
	3m				
	→				
	\downarrow A \downarrow D				
			1		
			+		-
Q.3(a)	Find the slope and vertical deflection at the free end B for the	10	3	3,4	1.3.1
	beam supported and loaded as shown in figure below. Use				2.1.3
	conjugate method only.				
Ì	10 kN			1	
	—				
	A 3m B				
	3m B				
	1				
			 	ļ	
.3(b)	Find the slope and vertical deflection at C for the beam supported	10	3	24	121
	and loaded as shown in figure below. Use moment area method	10		3,4	1.3.1 2.1.3
	only.				
	70 kN 50 kN				
	A				
	4 m C 3 m D 3 m		1		
$\neg +$			 		





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Q.4(a)	For the pin jointed frame loaded as shown in figure below, find the vertical deflection of joint A.	10	3	3,4	1.3.
	40 kN A 3 m B 3 m D 5 m C				
Q.4(b)	Determine the horizontal deflection of point D of the rigid jointed frame loaded as shown in figure below.	10	3	3,4	1.3.
	B C 4m 20 kN/m				
).5(a)	Using Macaulay's method only, find the slope and vertical deflection at D for the beam supported and loaded as shown in figure below.	10	3	3,4	1.1.1 1.3.1 2.4.1
	60 KN 40 KN A				
).5(b)	Find the strain energy stored <u>due to bending moment only</u> for the beam loaded as shown in the figure below.	10	2	3,4	1.1.1 1.3.1 2.4.1
	50 kN 10 kN/m A B C V V V V V D 7777 3m 3m 4m 7777				







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Q.6(a)	For the frame loaded as shown in figure below	10	4	3,4	1.1.1
	a) Find the support reactions				1.3.1
	b) Draw AFD, SFD & BMD for member CD only				2.4.1
	60 kN B 3m C 10 kN/m A 4 m D				
			-		
Q.6(b)	Compare the crippling loads given by Euler's and Rankine's	10	4	3,4	1.1.1
	formulae for a steel column 4.0 m long with both ends fixed. The				1.3.1 2.4.1
	cross section of the column is a symmetrical I section with the				2.4.1
	following dimensions.				
	Top and bottom Flange width = 300 mm,				
	Top and bottom Flange thickness = 20 mm,				
	Depth of web = 400 mm , Thickness of web = 40 mm .				
	Take $E = 2x10^5 \text{ N/mm}^2$, $f_c = 350 \text{ MPa}$ and				
Q.7(a)	Rankine's constant = 1/7000.			ļ	ļ
Q./(a)		0.0			
	(i) Name the methods of finding deflection in structures.	03	3	2	1.3.1
	(ii) State and explain Maxwell's reciprocal theorem.	04	2	2	1.3.1
	(iii) What are the limitations of Euler's formula for buckling load of a column?	03	4	2	1.3.1
0.7(5)		10		1	ļ <u></u>
Q.7(b)	Locate the principal axes and find the principal moments of	10	1	3,4	1.1.1
	inertia for the angle section shown in figure below.				2.4.1
	250 mm 20 mm 20 mm 150 mm				





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

Re-Exam End Semester Examinations: July 2022

eering Duration: 3 Hours

Program: B.Tech. in Civil Engineering

Maximum Points: 100

Course Code: PC-BTC402

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Course Name: Structural Mechanics

Semester: IV

Attempt any FIVE questions out of SEVEN questions.
 Answers to all sub questions should be greater to all sub questions.

817/22

Answers to all sub questions should be grouped together.
 Figures to the right indicate full marks.

4. Assume suitable data if necessary and state the same clearly.

Q.No.	Questions	Points	СО	BL	PI
Q.1(a)	A 15 m high masonry dam of trapezoidal cross section has the top and bottom widths of 2m and 5m respectively as shown in figure below. The dam retains water on its vertical face to a depth of 15 m. Determine the maximum and minimum stresses developed at the base of the dam. The unit weight of masonry is 20 kN/m³ and that of water is 10 kN/m³.	,	1	4	1.1. 1.3. 2.4.
	2.0 m				
	A rectangular cross section of width 230 mm and depth 400 mm is subjected to a bending moment of 70 kN-m at 70 degrees to the negative X axis as shown in the figure below. Find the location of the neutral axis and show it in the cross section. Find the maximum and minimum bending stresses and state their location in the cross section.	10	1	1	1.1.1 1.3.1 2.4.1
	70 kN-m 70° X				



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

Re Exam End Semester Examinations: July 2022

Q.2(a)	State and explain Maxwell's reciprocal theorem.	05	2	2	1.3.1
Q.2(b)	For the frame loaded as shown in figure below a) Find the support reactions b) Draw AFD, SFD & BMD	15	2	3,4	1.3.1 2.1.3
	20 kN/m B 2m 20 kN 2m 20 kN				
Q.3(a)	Find the slope and vertical deflection at D for the beam supported and loaded as shown in figure below. <u>Use conjugate method only.</u>	10	3	3,4	1.3.1 2.1.3
	A				Market and delivery and the second of the se
Q.3(b)	Find the slope and vertical deflection at B for the beam supported and loaded as shown in figure below. <u>Use moment area method only.</u>	10	3	3,4	1.3.1 2.1.3
	90 kN B C V V V D A M				





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

Re-Examend Semester Examinations: July 2022

Q.4(a	For the pin jointed frame loaded as shown in figure below, find the vertical deflection of joint C.	10	3	3,4	1.3.1
	3m 3m 3m 3m 40 KN				
Q.4(b)	Determine the vertical deflection of point C of the rigid jointed frame loaded as shown in figure below.	10	3	3,4	1.3,1 2.1.3
	80 kN B 2m 2m D 5 kN/m 4m				
Q.5(a)	Using Macaulay's method only, find the slope and vertical deflection at D for the beam supported and loaded as shown in figure below.	10	3	3,4	1.1.1 1.3.1 2.4.1
	A B C V V V V V V D 25 kN/m C V V V V V V V V D 4m				
Q.5(b)	Find the strain energy stored due to bending moment only for the beam loaded as shown in the figure below.	10	2	3,4	1.1.1 1.3.1 2.4.1
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				



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Munshi Nagar, Andheri (W) Mumbai – 400058

Ne - Exam - End Semester Examinations: July 2022

Q.6(a)	For the frame loaded as shown in figure below	10	4	3,4	1.1.1
	a) Find the support reactions			>0-	1.3.1 2.4.1
	b) Draw AFD, SFD & BMD for member CD only				
	25 kN/m				
	\mathbf{B} $\mathbf{4m}$ \mathbf{C}				
	3m 15 kN → 3m				
	A D D	l a	-		
Q.6(b)	Compare the crippling loads given by Euler's and Rankinc's formulae for a steel column 3.0 m long with both ends hinged. The cross section of	10	4	3,4	1.1.1 1.3.1 2.4.1
	the column is a symmetrical I section with the following dimensions. Top and bottom Flange width = 350 mm, Top and bottom Flange thickness = 30 mm,				2.4.1
	Depth of web = 300 mm, Thickness of web = 30 mm. Take $E = 2x10^5 \text{ N/mm}^2$, $f_c = 350 \text{ MPa}$ and				
	Rankine's constant = 1/7000.				
Q.7(a)					
	(i) Name the methods of finding deflection in trusses.	02	3	2	1.3.1
	 (ii) Write the expression for the strain energy stored in a member due to (a) Axial force (b) Shear force Explain the terms involved in each expression 	04	2	2	1.3.1
	(iii) Explain how the buckling load carrying capacity of a compression member can be increased.	04	4	2	1.3.1
Q.7(b)	Locate the principal axes and find the principal moments of inertia for the angle section shown in figure below.	10	1	3,4	1.1.1 1.3.1 2.4.1
	15 mm 180 mm				
	130 mm				



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

End Semester Direct Second Year - July 2022 Examinations

Direct second year - July 2022 Examinations

D. J. M. D. Tech (G v/1) Jun

Program: B. Tech. Civil Engineering

Course Code: PE-BTC404

Course Name: Surveying & Geomatics

Duration: 3hrs.

Maximum Points: 100

Semester: IV

11/7/22

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)				
	Define: 1. Tangent distance and External distance of a simple horizontal curve 2. Shift in a transition curve and Grade of a vertical curve 3. Sounding and Range lines 4. Signal and Tower in a triangulation system 5. Remote sensing system and Image interpretation 6. Focal length and photo scale in aerial photographs 7. Total station and EDM 8. Global positioning system 9. Anallactic lens in a tacheometer 10. Horizontal and vertical control in setting out works	20	1,2,3	1,4	1.1.1
2.A 2.B	Calculate the necessary data for setting out the curve if it is intended to set out the curve by Rankine's method of tangential angles. If the theodolite has a least count of 20", tabulate the actual readings of deflection angles to be set out. Give 1 data: Chainage of point of intersection 1192m. Deflection angle 50°30' Radius of the curve 300m Take peg interval of 20m. Describe briefly, with neat sketches, the location of sounding stations by means of 1) Cross rope sounding (5) 2) Intersecting ranges (5)	10			
3.A	Enlist the instruments used for setting out works (3). Explain the method of locating the centre line of a bridge by triangulation method (7)	10			The second secon
3.B	Explain, with neat sketch, the fixed hair method / stadia method for tacheometric measurements (5) and derive the stadia equation for a	10			



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End Semester Direct Second Year - July 2022 Examinations

-	line of sight perpendicular to the staff intercept (5).			
4.	Explain in short the following for a triangulation system: (any two) 1. Baseline measurement 2. Strength of a figure 3. Base net	10		
4.B	4. Use of Signals and towers A parabolic vertical curve is to be set out connecting two unirom grades of +0.8% and 0.9%. The chainage and reduced level of point of intersection are 1664m and 238.755m respectively. The rate of change of grade is 0.05% per 20m. Calculate the chainages and reduced levels of the various stations.			-
5.	Explain in detail, with neat sketches: (5 points each) 1. Working of a remote sensing system 2. Types of GPS 3. Relief displacement 4. Electromagnetic sectrum in EDM	20	+	
6.A	 State various methods of determining the length of transition curve (1). Explain any one method in detail (2). Explain the concept of 'Super-elevation' (3). A transition curve is required for a circular curve of 200m radius. The gauge being 1.5m and maximum super-elevation restricted to 15cm, the transition is to be designed for a speed such that no lateral pressure is imposed on the rails and the rate of gain of radial acceleration is 30cm/s3. Calculate the required length of the transition curve (3). 	12		
.B	Explain the method of 'Reduction to centre' by establishing a satellite station			
	Write short notes on: (any transition)	8	-	
	 a. Non-registering or Self registering tide gauges b. Primary, secondary and tertiary triangulation methods c. Laying the plan of a new structure w.r.t some permanent d. Errors in stadia measurement 	20		

---- The End ----

SARDAR PATEL COLLEGE OF ENGINEERING



22/1/22

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

End Semester May 2022 Examinations

Program: B. Tech. Civil Engineering S. M. B. Tech (Civil Duration: 3hrs

Maximum Points: 100 Course Code: PE-BTC404

Semester: IV Course Name: Surveying & Geomatics

Notes:

There are TOTAL SEVEN MAIN questions, each of 20 points. 1.

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.

figures/table with appropriate sketches/facts 6. Answers be accompanied chart/graph/diagram/flowchart wherever necessary or required.

Q.No.			Qu	estions			Points	co	BL	PI
1.	Answer the	following:	(2 mark	s each)						
1.	1. Differer points) 2. Define: 3. Disting photogram phot	Principal Pouish between the between the Super-eleva on. The basic principal position fix a) Tides b) the two methods and freen thingth and freen thingth and freen thingth selements of the sel	oint and leveen Manly 2 point and leven Intertion and maining in a Sounding lods of Equency.	ngulation ar Nadir Metric and nts) mal focusing give the fo f positioning GPS. g EDM. Give e & Passive	Interpretive g and external for finding g in GPS. State the relationship because the relationship because the straights a	aerial ocusing super- he two	20	1,2,3	4 1 4 4 1 1 1 4 1	1.1.1
2.A	Given the d	,				,	10	1,3	3	1.1.2
	Inst. stn	Staff stn	Line	Bearing	Vertical angle	<u> </u>	ia readings	_		
	0	A	OA	84°36'	3°30'		, 2.10, 2.85	_		
	0	В	OB	142°24'	2°45'		2.875, 3.76			
	Staff held no	ormal at bot	h the stat	tions	d the gradient betv		ions A & B.			
2.B	curve is to be Radius of circle Rail gauge Super-eleva	e provided a rcular curve	at its both - 300m	h ends. Follo	railway line, a tra owing data is avail os ³		5	2,3	3	1.1.2



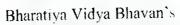
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End Semester May 2022 Examinations

	Design: Design speed of the vehicle (1), Length of the transition (2)				
2.C	curve, Spiral angle (1) and Shift (1) of the transition curve6 Draw a neat sketch and show the range line, sounding points and shore line (2) State the essential points to be considered while planning the sounding points. (3)	5	1,3	1 2	1.1.1
3.A	a) Explain, with the help of a neat sketch, the 'Tangent Correction method' of setting out Vertical curve. (4) b) Calculate the chainages of the tangent point and the apex of the vertical curve connecting two grades of +0.6% and -0.9%. The chainages and the RL of intersection point are 985.5m and 1430m respectively. The rate of change of grade for the curve is 0.75 % per 30m. (6)	10	1,3	2	1.1.2
3.B	State and explain various errors in stadia measurement in a tacheometric survey.	5	1,3	2	1.1.1
3.C	Give the importance of setting out works with an appropriate example. (3) State the prerequisites for locating a new structure w.r.t the permanent structures. (2)	5	1,2	1 2	1.1.1
4.A	Classify (in detail) the aerial photographs on the basis of alignment of optical axis.	8	1,3	2	5.1.1
4.B	State various figures of triangulation (1). With neat sketches, explain the figures (5).	6	1,3	1 2	1.1.1
4.C	Explain where and how the Echo sounding machine / Fathometer is used to measure the depth of the water in a water body. (4) Give the advantages of using the echo sounding machine / Fathometer. (2)	6	1,3	2	5.1.1
5.A	Explain 'Stereoscopic parallax' (4) and explain how absolute and differential parallax can be used to obtain the height of the object (4).	8	1,3	2	1.1.1
5.B	State the characteristics of Electromagnetic (EM) waves.	4	1,3	1	5.1.1
5.C	Explain the basic procedure for setting out the foundation of a structure on a given site as per the plans.	8	1,2	2	1.1.1
6.A	State and explain different types of Image interpretation (3). State various elements of Image interpretation (2) and explain any one element of interpretation with an appropriate example (3).	8	1,3	2	5.1.1
6.B	State and explain the criteria for selection of figure for triangulation survey.	6	1,3	2	1.1.1
6.C	With neat sketches, explain the method of sounding: i) By range and one angle from boat (3) ii) By two angles from shore (3)	6	1,3	2	5.1.1
7.A	i) Aerial photographs were taken with a camera having a focal length of 180mm, the average elevation of the ground in the photograph was	8	1,3	3	5.1.1







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	160m. Find: a) scale of the map if the flying height was 2500m. (2) b) the flying height required to have a photo scale of 1 in 6000. (2) ii) Find the number of photographs required of size 250mm x 250mm to cover an area of 20km x 16km, if the longitudinal overlap is 60% and the side overlap is 30%. Scale of the photograph is 1cm = 150m. (4)				
7.B	Give the difference between Electronic theodolite, EDM and Total station. (atleast 4 points)	4	1,3	4	5.1.1
7.C	Explain the method of achieving horizontal and vertical control in setting out works.	8	1,2	2	1.1.1

---- The End -----



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

End Semester July 2022 Examinations

J. y. A. Tech (Civil) Sem IV

Program: B. Tech. Civil Engineering

Course Code: PE-BTC404

Course Name: Surveying & Geomatics

Duration: 3hrs.

Maximum Points: 100

1117122

Semester: IV

Notes:

1. There are TOTAL SEVEN MAIN questions, each of 20 points.

2. QUESTION 1 is COMPULSORY.

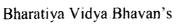
3. From the remaining SIX Questions Solve ANY FOUR.

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)				
	 With neat sketches, define Triangulation and Trilateration. Define: stereoscopic parallax Distinguish between true vertical, vertical and tilted photographs Differentiate between Stadia method and Non-stadia method of tacheometric measurements. Define Super elevation and Sight distance, with neat sketches. With neat sketches, differentiate between static single point and static relative positioning. State the advantages of using total station for a land survey. Explain, in short, Electromagnetic radiation spectrum. State different types of resolutions in a remote sensing system. Give the elements of horizontal simple circular curve, with a neat sketch. 	20	1,2,3	1,4	1.1.1
2.A	A tacheometer was setup at a station P and the readings on a vertically held staff at Q were 2.255, 2.605, 2.955, the line of sight being inclined at +8°24'. Another observation on the vertically held staff at benchmark (B.M.) gave the readings 1.640, 1.920 and 2.200, the inclination of the line of sight being +1°6'. Draw neat sketch of the profile (2) and calculate: 1. Horizontal distance between P and Q (3). 2. Elevation of Q if the R.L. of B.M. is 418.685m (5). Take the tacheometric constants as 100 and 0.3.	10	1,3	3	1.1.2
2.B	Two tangents intersect at chainage 1192m, the deflection angle being 50°30'. Calculate the necessary data for setting out a curve of 15 chains by offsets from chord. Take peg interval equal to one chain. The length of the chain is equal to 20m.	5	2,3	3	1.1.2
2.C	State various methods of locating the soundings (2). Explain with a neat sketch the method of sounding location by Crossrope (3).	5	1,3	1 2	1.1.1







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			1.0	14	
	A road bend which deflects 800 is to be designed for a maximum speed of 100kmph, a maximum centrifugal ratio of ¼ and a maximum rate to the change of acceleration of 30cm/sec3, the curve consisting of a circular arc combined with two cubic spirals. Calculate				
3.A	1) Radius of the circular arc (2), 2) Required length of transition curve (1), 3) Total length of combined, circular and transition, curve (3), and 4) Chainages of the start and end of the transition curves, and of the junction of the transition curves with the circular arc, if the chainage of the point of intersection is 42862m (4).	10	1,3	3	1.1.2
	State the principle of stadia method (1). Explain the procedure for finding the tacheometric constants (4).	5	1,3	1 2	1.1.
	Explain how horizontal control and vertical control is important for setting out works.	5	1,2	2	1.1.
4.A	Explain with a neat sketch how the scale of vertical photograph can be determined (4). Give the steps for Computation of a flight plan for aerial photography (4).	8	1,3	2	5.1.
4.B	State the purpose of 'Triangulation survey' (3). Classify the triangulation methods (3).	6	1,3	1 2	1.1.
	Write a note on "Use of Shore signals and Buoys for taking the sounding".	6	1,3	2	5.1.
5.A	Explain with a neat sketch: (any two) 1. Stereoscopic view (4) 2. Relief displacement (4) 3. Crab and Drift (4)	8	1,3	2	1.1.
5.B	State and explain various remote sensing platforms (6). State the basic requirements of an ideal remote sensing system (4). Explain how a real remote sensing system differs from an ideal remote sensing system (2).	12	1,3	1 1 2	5.1.
6.A	Define 'Image interpretation' (2). State the fundamentals of image interpretation (2). Give the elements of image interpretation (2). Give some applications of image interpretation (2).	8	1,3	1	5.1.
6.B	Explain 'Baseline measurement for triangulation survey' (2). State the factors for selection of baseline (2). Give the methods for baseline measurement (2).	6	1,3.	2	1.1.
6.C	Explain how a tide gauge is used to determine the exact water surface level. (4) Explain any one non-registering / self-registering tide gauge (2).	6	1,3	2	5.1.
7.A	The scale of an aerial photography is 1cm=100m, the photograph size is 200mm x 200mm. Determine the number of photographs required to:	8	1,3	3	5.1.
	1. Cover and area of 100sq.km if the longitudinal lap is 60%			Page 2 c	of 3



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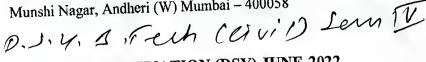
End Semester July 2022 Examinations

	and side lap is 30% (3). 2. Cover and area of 10km x 10km if the longitudinal lap is 60% and side lap is 30% (3). Is the answer for both 1 and 2 same? If not why? (2)				
7.B	Write a note on 'Auto reduction tacheometer'.	4	1,3	4	5.1.1
7.C	Explain with a neat sketch any one method to transfer the levels from the surface to underground.	8	1,2	2	1.1.1

---- The End ----



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



ENDSEM- EXAMINATION (DSY) JUNE-2022

Program: CIVIL

Duration: 03 Hours

Course Code: BS-BTC401

Maximum Points: 100

Course Name: PROBABILITY & STATISTICS

Semester: IV

• Attempt any five out of seven questions

4/7/22

Use of scientific non-programmable calculator is allowed.

QN O.	QUESTION	PO IN TS	СО	BL	PI
QI ı)	Let X & Y be two independent binomial variates with parameters $(n_1=6,p=1/2)$ and $(n_2=4,p=1/2)$ respectively.	06	1	2	2.1.3
QI o)	Evaluate $P(X+Y)=3$. Verify whether the following functions can be looked upon as probability density function? $f(x) = \frac{1}{2}e^{- x }, -\infty < x < \infty$	06	3	1	1.1.2
QIc)	In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible: Variance of $X = 9$ Regression equations: $8x - 10y + 66 = 0$ $40x - 18y = 214$ What are i.Mean, value of x and y ii.Standard deviation of y. iii.Coefficient of correlation between x and y	08	1	1	2.1.3
QII a)	The diameters of can tops produced by a machine are normally distributed with standard deviation of 0.01 cms. At what mean diameter the machine be set that not more than 5% of the can tops produced by the machine have diameters exceeding 3 cms?	06	1	2	2.1.4
QII b)	In an examination marks obtained by students in mathematics, physics and chemistry are normally distributed with means 51,52 and 46 with standard deviations 15,12,16 respectively. Find the probability of securing total marks (i) 180 or more (ii) 90 or	06	2	2	2.3.1
QII c)	below A & B throw alternately a pair of dice whoever throw '9' first wins the game. If 'A' starts the game. What are their chances of winning?	08	1	1	2.4.1



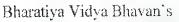
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ENDSEM- EXAMINATION (DSY) JUNE-2022

III	Two bad e	oos are mix	ced accider	ntly with 10) good	ones. I	ind the	06	3	2	1.1.2
)	probability	distributio	on of the nu	ımber of ba	ad eggs	in 3, d	rawn at				-
1	probability	ithout renla	acement from	om this lot.							
	random, w	Tuilout repr	a in siv shop	s before and	after a st	ecial pr	omotiona	1 06	1	2	1.1.1
SIII			ie ili six shop	3 Octore una	urcer u sp	,					
)	campaign ar	A	В	С	D	E	F				
Ì	Shops Before	53	28	31	48	50	42		10 10		
	Campaign			(5)							
	After	58	29	30	55	56	45				
	Campaign										
1	Can the cam	paign be jud	ged to be a si	uccess at 5%	LOS.						10.10
QIII	If $z = ax + b$	by and 'r	is the con	relation bet	ween x	and y	show	08	1	2	2.1.3
·	1										
c)	that	2 2 2	12 2 . 2	1							
	σ_{z}	$a^2 = a^2 \sigma_x^2 +$	$b^2\sigma_y^2 + 2a$.brσ _x σ _y							1
	Further sh	now that									
	}		$-\sigma^2$								
	r	$=\frac{\sigma_x^2 + \sigma_y^2}{2\sigma_y^2}$	<u>x-y</u>								
	1	^	,								
	Where o	, σ_{ν} and σ_{ν}	x-v are the s	tandard de	viation o	of x, y a	nd x - y				1
	}		. ,								
	respective							_			1001
QIV	A car – h	ire firm ha	s two cars,	which it hi	res out	day by	, day. T	he 06	1	3	2.3.1
	number of	f demands	for a cal o	n each day	is distr	ibuted	a Poiss	on			
a)	1: atuibuti	on with me	ean 1.5 Ca	lculate the	proport	ion of	days on				
	distributi	Oll Mini ilik	used and t	he proporti	on of d	avs on	which				
	which ne	iliner car is	used and t	ne propera	011 01 -						
	some der	nand is ref	usea.		o antai	n dietr	icts from	na 06	2	2	1.1.3
QIV	Two sal	esman A a	nd B are w	orking in a	i certai	n uisu	icts mon	1 4 50		-	
b)	sample s	urvey cond	lucted by u	he head off	l ctate	wheth	er there	is			
	F	ollowing 1	esults wer	re obtained ence in like	i State Savera	oe sale	es betwe	een			
				ince in nav	avera	ec par	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
	t	he two sale	esmen.	A		3			Ì		
				I A							
	1	No of Sale	es	10		18					
		110 02 0		-14				1		İ	
		Yarn B		170		205					
		Standard o	leviation	20		25					
-	V 0	la anasıması	n'e rank co	orelation c	nefficie	nt for	the	08	3 1		2.3.1
QI	v Compu	e spearmai	1 2 Tally CO	OTOTALIOIT O							
(c)	followi	ng uata									







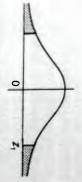
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ENDSEM- EXAMINATION (DSY) JUNE-2022

		X	10	12	18	18	15	40)					
		Y	12	18	25	25	50	25	j				-	
QV a)	Fit a bi	oretica	al freq		ies wit	h the	actual	ones		compare	10	1	1	2.3.1
		X f	0 2	14	20	3	22	<u>5</u>	-					
QV b)	In an e	xperir	nent c	n im	muniza	ation	1		om tube	rculosis the	10	3	2	1.1.1
					Affec	ted			Not af	fected				
		Inocu	lated		267	7			27					×
		Not I	nocula	ated	757				155					
	Use Cl preven	ting tu	ıbercı	ılosis										
QVI a)	worker certain In the the me 58?	day a light an of	a fact are for of this the n	ory, und to s data numbe	the no be 51 a, wou er of i	of it, 52, ld it tems	tems per section of the section of t	orodu 5, 56, oropri ced i	ced by 57, 58 tate to n the p	number of them on a , 59, 59, 60. suggest that opulation is		2	1	1.1.3
QVI b)		is throappe			nes wi 1	th the	follo 3	wing 4	results 5	6	10	1	3	2.1.3
	1	quenc	y		40	3 2	28	50	54	60				
	Show	that th	e die	is bia	sed	·								
QVI I a)	Fit a P	oissor X f	distr 0 123	1	2	3	3	ng dis 4 1	tributio	on	10	3	3	2.1.4
QVI Ib)	lamps 1000 b	in the ournin	street g hou	ts of t rs wi	the city	.If th indard	ese la devia	mps l ation	nave av	electric erage life of hours, what	10	3	2	1.1.3
	i)	i	n first	800	hours) hours			,						

 $\widehat{\Xi}$

Percentage Points of t- distribution



For $\Phi = 10$ d. o. f. P(|t| > 1.812) = 0.1Example

8	. 120	60	, 45	30	_ 29	28	- 27	26	25	24	23	22	21	20	19	18	17	16	is	14	13	12	=	10	တ	œ	7	o	cn	4	ယ	N	_	7
1.282	1.289	1.296	1.303	1.310	1.311	1.313	1.314	1.315	1.316	1.318	1.319	1.321	1.323	1.325	1.328	1.330	1.333	1.337	1.341	1.345	1.350	1.356	1.363	1.372	1.383	1.397	1.415	1.440	1.476	1.533	1.638	1.886	3.078	0.20
1.645	1.658	1.671	1.684	1.697	1.699	1.701	1.703	1.706	1.708	1.711	1.714	1.717	1.721	1.725	1.729	1.734	1.740	1.746	1.753	1.761	1.771	1.782	1.796	1.812	1.833	1.860	1.895	1.943	2.015	2.132	2.353	2.920	6.314	0.10
1.960	1.980	2.000	2.021	2.042	2.045	2.048	2.052	2.056	2.060	2.064	2.069	2.074	2.080	2.086	2.093	2.101	2.110	2.120	2.131	2.145	2.160	2.179	2.201	2.228	2.262	2.306	2,365	2.447	2.571	2.776	3.182	4.303	12.706	0.05
2.325	2.358	2.390	2.423	2.457	2.462	2.467	2.473	2.479	2.485	2.492	2.500	2.508	2.518	2.528	2.539	2.552	2.567	2.583	2.602	2.624	2.650	2.681	2.718	2.764	2.821	2.896	2.998	3.143	3.365	3.747	4.541	6.965	31.612	0.02
2.576	2.617	2.660	2.704	2.750	2.756	2.763	2.771	2.779	2.287	2.797	2.807	2.819	2.831	2.845	2.861	2.878	2.898	2.921	2.947	2.977	3.012	3.055	3,106	3.169	3.250	3.355	3.499	3.707	4.032	4.604	5.641	9.925	63.657	0.01

Applied Mathematics - IV (Civil / Const. / Prod.)

Statistical Tables

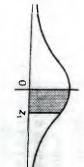
Percentage Points of χ^2 - Distribution



 $P(\chi^2 > 15.99) = 0.10$ For $\Phi = 10$ d. o. f. Example

_																																
٤	3 6	8	28	27	26	25	24	23	2	2	Š	3 =	. ā	; =	i	5	4	<u> </u>	72	: =		10	9	æ	7	თ	m	4	ယ	N		Ø/
14.953	4.200	14 256	13.565	12.879	12 198	11.524	10.856	10.196	9 542	8 897	8.260	7.633	7,015	6,408	5.812	4.229	4.660	4.107	3 571	3 053		2 558	2.088	1 646	1 339	872	.554	,297	.115	0201	.000157	99. = 0
18 493	1,708	47 700	16.928	16.151	15.379	14.611	13.848	13,091	12.338	11,591	10 851	10,117	9.390	8 672	7 962	7.261	6,571	5,892	5.226	4.575		3.940	3.325	2.733	2,167	1.635	1.145	.711	.352	.103	.00393	0.95
29.336	28.336	2000	27.336	26.336	25.336	24.337	23.337	22,337	21.337	20.337	19.337	18.338	17.338	16.338	15.338	14.339	13.339	12.340	11.340	10.341		9.340	8.343	7.344	6.346	5.348	4.351	3.357	2.366	1.386	.455	0.50
40.256	39.087	07.810	37 016	36.741	35.363	34.382	32.196	32.007	30.813	29.615	28,412	27.204	25.989	24.769	23.542	22.307	21,064	19.812	18.549	17.275		15.987	14.684	13.362	12.017	10.645	9.236	7.779	6.251	4.605	2.706	0.10
43.773	42.567	41.33/	41 227	40 113	38.885	37.652	36,415	35.172	33.924	32.671	31,410	30.144	28.869	27.587	26.296	24.996	23.685	22.362	21.026	19.675		18.307	16.919	15.507	14.067	12.592	11.070	9.488	7.815	5.991	3.841	0.05
47.962	46.693	45.419	1	44 140	41.856	41.566	40.270	38.968	37.659	36.349	35.020	33.687	32.346	30.995	29.633	28.259	26.873	25.472	24.054	22.618		21 161	19.679	18,168	16.622	15.033	13.388	11.668	9.837	7.824	5.214	0.02
50.892	49.588	48.278	40.863	40.000	45 642	44.314	42 980	41.638	40.289	38.932	37.566	36.191	34.805	33.409	32.000	30.578	29.141	27.688	26.217	24.725	20.2.03	22 200	21.666	20.090	18.475	16.812	15.086	13.277	11.341	9.210	6.635	0.01

Area Under Standard Normal Curve



The table gives the area under the standard normal curve from z=0 to $z=z_1$ which is the probability that z will lie between z=0 and $z=z_1$

2	.8	.01	.02	.03	.04	.06	.06	.07	.08	
0.0	.0000	.0040	.0080	.0120	.0160	0199	0230	070	0310	2050
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	0714	
0.2	.0793	8832	.0871	.0910	.0948	.0987	1026	1064	1 1 1	
0.3	.1179	.1217	.1255	.1293	.1331	.1368	1406	1443	1/180	
0.4	1554	1591	.1628	1664	.1700	.1736	1772	1808	.1844	
0,5	.1915	.1950	.1985	.2019	.2054	2088	0103	2157	3	
0.6	2257	.2291	.2324	.2357	2389	2422	2454	0486	3617	
0.7	.2580	2611	.2642	2673	.2703	2734	2764	2704	2833	
0.8	2881	.2910	.2939	.2967	.2995	.3023	3051	3078	3106	
0.9	3159	.3186	.3212	.3238	.3264	.3289	3315	.3340	3365	
.0	.3413	.3438	.3461	.3485	3508	3531	322	3677	3500	
	.3643	.3665	3686	.3708	3729	3749	3770	3790	3810	2020
20	.3849	.3869	.3888	.3907	.3925	.3944	3962	3980	3907	4015
ü	.4032	.4049	.4066	.4082	.4099	4115	4131	4147	4160	
4	4192	4207	.4222	.4236	.4251	.4265	.4279	4292	4306	4319
5	.4332	.4345	.4357	.4370	.4382	4394	4406	4418	100	
6	.4452	.4463	.4474	.4484	.4495	.4505	4415	4525	4535	1545
1.7	4554	.4564	.4573	.4582	.4591	.4599	4608	4616	4605	4633
8	.4641	.4649	.4656	.4884	.4671	.4678	.4686	.4693	4699	-
9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	4767
2.0	4772	.4778	.4783	.4788	.4793	4798	4803	4808	2	
2.1	.4821	.4826	.4830	.4834	.4838	4842	4846	4850	1951	481/
2.2	.4861	4864	.4868	.4871	.4875	4878	4841	4864	4007	1007
23	.4893	.4896	.4898	.4901	.4904	.4906	4909	4911	4913	4016
2.4	4918	.4920	4922	.4925	.4927	.4929	.4931	.4932	.4934	4936
25	.4938	.4940	.4941	4943	.4945	4946	4949	4040	200	
2.6	.4953	.4955	.4956	.4957	4959	4560	4961	4060	4063	7004
2.7	,4965	.4966	.4967	.4968	.4969	.4970	4971	4070	4073	4904
8	.4974	.4975	.4976	4977	.4977	.4978	4979	4979	4990	4091
6	.4981	.4982	4982	.4983	.4984	.4984	.4985	4985	4986	4986
3.0	.4987	4987	.4987	.4988	4988	.4989	4989	.4989	4990	4990





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ENDSEM- EXAMINATION MAY-2022

Program: CIVIL

Sy.B. Tech (Civi) Les

Duration: 03 Hours

Course Code: BS-BTC401

Maximum Points: 100

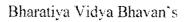
Course Name: PROBABILITY & STATISTICS

Semester: IV

Attempt any five out of seven questions

Use of scientific non-programmable calculator is allowed.

QN O.	QUESTION	PO IN TS	СО	BL	PI
QI)	The ratio of the probability of 3 successes in 5 independent trials to the probability of 2 successes in 5 independent trials is \(^{4}\). What is the probability of 4 successes in 6 independent trials?	10	1	2	2.1.3
QI))	Given below is the probability distribution of a drv x with mean=16 then find 'a' & 'b' and variance of x	10	3	1	1.1.2
	x 8 12 16 20 24 P(x) 1/8 a b 1/4 1/12				
QII a)	If the actual amount of coffee which a filling machine puts into 6 ounce jars is a random variable having normal distribution with standard deviation 0.05 ounce and if only 3% of the jars are to contain less than 6 ounce of coffee what must be the mean fill of these jars?	10	1	2	2.1.4
QII b)	In an examination marks obtained by students in mathematics, physics and chemistry are normally distributed with means 51,53 and 46 with standard deviations 15,12,16 respectively. Find the probability of securing total marks (i) 180 or more (ii) 90 or below	10	2	2	2.3.1
QIII a)	Five defective bulbs are accidently mixed with twenty good once. It is not possible to just look at the bulb and tell whether or not it is defective. Find the probability distribution of the number of defective bulbs, if four bulbs are drawn out at random from	10	3	2	1.1.2



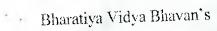




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ENDSEM- EXAMINATION MAY-2022

	this lot.	,								-					
QIII b)	The sales campaign				n six sho	ps bef	ore an	d after a	a spec	ial p	romotional	10	1	2	1.1.1
-,	Shops		A		В	C		D		E	F				
	Before Campaig	gn	53		28	31		48		50	42				
	After Campaig		58		29	30		55		56	45				
	Can the ca	ampa	ign be j	udged	to be a s	uccess	at 5%	6 LOS.							
					······										
QIV a)	Suppose that the with a m	dem	and fo	r tube	lights	rougł	nly d	istribu	ted a	s Po	isson	10	1	3	2.3.1
	1	part	ticular	week	. What	is the	e pro	babilit	•		e demand				
QIV b)	Prices o found to Discuss	be 6	66, 65,	69, 7	0, 69,	71, 70), 63,	64 an			onth were	10	2	2	1.1.3
QV	Fit a bin									coı	npare	10	1	1	2.3.1
a)	the theor			uenci				r	1						
		X	0	1	2 20	34	4 22	5 8							
QV b)	Investige father ar			ociati	on bety followi	ween	the d			eye	colour in	10	3	2	1.1.1
			·		Dark				Not I	Dark					
	D	ark(Son)		48		15		90						
	N	lot D	ark(So	on)	80			,	782	-					
	T	otal			128				872						
						- Julius	····								







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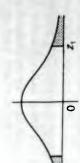
ENDSEM- EXAMINATION MAY-2022

						C -1 -	liat A	the in	crassas	in weight in	10	12	1	1.1.3
QVI	For a r	andon	n samp	le of 1	O pigs	tea c	16 A	, me	12 8 14	in weight in				
)	pound	s in a (certain	period	were	£ 10, 0	iae	fed on	diet B.	1, 15, 9. the				
<i>'</i>	For ar	other	rando	m san	ipie o	114 }	13	22 15	diet B,	18, 8, 21,				
	increa	se in 1	the san	ne per	100 W	into	, 1 <i>)</i> , A <i>P</i> r 1	22, 13, Q differ	r signif	, 18, 8, 21, icantly as				
	23, 10), 17.	Test w	hethe	the C	nets A	voi al	ot unite	3161111	icantly as				
	regard	is thei	r effec	t on 11	ncreas	se III v	Weigi	ing rost	ilts		10	1	3	2.1.3
QVI	1				s With	2	3	ing resu	5	6				
b)	No		eared	on	1	2	3	-						
	die				40	32	28	50	54	60				
	Fre	equenc	СУ		40	32	20	30						
	Show	that t	he die i	is hiase	ed .		J							
	Show	tilat	ne are i	, D, GO	-									
	-													
														2.1.4
QVI	Fit a	poisso	on dist	ributio	n for	the	follov	ving da	ta and	also test the	10	3	3	2.1.4
I a)		ness o												
1 a)	0-	X	0	1	2	3	4	5			-			
				<u> </u>			+							
		f	142	156	69	27	5	1						
O T 77			1	<u> </u>	1	<u> </u>	11				10	3	2	1.1.3
QVI				14.1-	1.:4.	Jarra	that	a stude	nt nass	es if he				
Ib)	In a	n exan	ninatio	n it is	raid (TOWII	ulat	a stude	Int Duss	es if he	1		1	
	secu	res 30)% or 1	nore i	narks	. He i	s pia	cea m	181,11110	or IIIrd				
	divi	sion a	ccordi	ng as l	he sec	cures	60%	or mor	e mark	s, between				
	45%	8.60)% and	betw	een 3	0% &	: 45%	6 respe	ctively.	. He gets				
1	1		•	co he	secure	es 80%	∕₀ or	more n	narks. I	t is noticed		1		
	diet	nction	n in ca:	SE HE										
	dist	inction	n in ca: :ecult t	hat 10	% of	the st	uder	its faile	d in the	e examination	n			
	fron	n the i	esult t	hat 10	% of	the st	uder	its faile	ed in the	e examination	n			
	from	n the rere as	esult t 5% of	hat 10 them	% of obtair	the st ned di	uder stind	tion. C	ed in the Calculate division	e examination e the	ı			

 $\widehat{\Xi}$

Statistical Tables

Percentage Points of t-distribution



Example

 $P(\mid t \mid > 1.812) = 0.1$ For $\Phi = 10$ d. o. f.

0.01	63.657	9.925	5.841	4.604	4.032	3.707	3.489	3.355	3.250	3.169	3.106	3.055	3.012	2.977	2.947	2.921	2.896	2.878	2.861	2.645	2.831	2.819	2.807	2.797	2.287	2.779	2.771	2.763	2.756	2.750	2.704	2.660	2.617	2.576
0.02	31.812	6.965	4.541	3.747	3.365	3.143	2.998	2.896	2.821	2.764	2.716	2.681	2.650	2.624	2.602	2.583	2.567	2.552	2.539	2.528	2.518	2.508	2.500	2.492	2.485	2.479	2.473	2.467	2.462	2.457	2.423	2.390	2.358	2.325
0.05	12.706	4.303	3.182	2.776	2.571	2.447	2.365	2.306	2.262	2.228	2.201	2.179	2.160	2.145	2.131	2.120	2.110	2.101	2.093	2.086	2.080	2.074	2.069	2.064	2.060	2.056	2.052	2.048	2.045	2.042	2.021	2.000	1.980	1.960
0.10	6.314	2.920	2.353	2.132	2.015	1.943	1.895	1.860	1.833	1.812	1.796	1.782	1.77.1	1.761	1.753	1.746	1.740	1.734	1.729	1.725	1.721	1.717	1.714	1.711	1.708	1.706	1.703	1.701	1.699	1.697	1.684	1.671	1.658	1.645
0.20	3.078	1.886	1.638	1.533	1.476	1.440	1.415	1.397	1.383	1.372	1.363	1.356	1.350	1.345	1.341	1.337	1.333	1.330	1.328	1.325	1.323	1.321	1.319	1.318	1.316	1.315	1.314	1.313	1.311	1.310	1.303	1.296	1.289	1.282
a/	_	CV.	ო	4	ເດ	9	^	œ	o	<u></u>	=	12	t.	4	5	16	17	© ;	6	8	2	52	8	24		92	27	58	53	၉	40	09	120	8

Applied Mathematics - IV (Civil / Const. / Prod.)

(**E**)

Statistical Tables

Percentage Points of χ^2 - Distribution

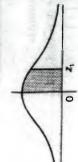


Example

 $P(\chi^2 > 15.99) = 0.10$ For $\Phi = 10 \, d. \, o. \, f.$

214 B R3E		_																											
5014	7 824		9.837	9.837	9.837	9.837 11.668 13.388 15.033	9.837 11.668 13.388 15.033	9.837 11.668 13.388 15.033 16.622	9.837 11.668 13.388 15.033 16.622 18.168	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161	9.837 11.668 13.388 16.622 18.168 19.679 21.161	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161 22.618	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161 22.818 24.054 25.472	9.837 11.668 15.033 16.622 18.168 19.679 21.161 22.618 24.054 26.873	9.837 11.668 13.388 16.622 18.168 19.679 21.161 22.618 25.472 26.873 28.259	9.837 11.668 13.388 16.622 18.168 19.679 21.161 22.618 24.054 25.472 26.873 28.259 29.633	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161 22.618 24.054 25.472 26.873 30.995	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161 22.818 25.472 26.873 29.633 30.995 32.346	9.837 11.668 13.388 16.622 18.168 19.679 21.161 22.618 25.472 26.873 28.259 29.633 30.995 33.887	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161 22.618 24.054 25.472 26.873 28.259 29.633 30.995 32.346 33.687	9.837 11.668 13.388 16.622 18.168 19.679 21.161 22.618 26.873 28.269 29.633 30.995 32.346 33.687 35.020	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161 22.618 24.054 25.472 26.873 30.995 32.346 33.687 35.020 37.659	9.837 11.668 13.388 16.622 18.168 19.679 21.161 22.818 24.054 25.472 26.873 29.633 30.995 32.346 32.346 33.687 36.349 36.349 37.659	9.837 11.668 13.388 15.033 16.622 18.168 19.679 21.161 22.818 26.873 26.873 29.633 30.895 32.346 33.887 36.346 37.659 37.659 38.968	9.837 11.668 13.388 16.622 18.168 19.679 21.161 22.618 24.054 25.472 26.873 30.895 30.895 33.887 35.020 38.968 40.270	9.837 11.668 13.388 15.033 16.622 18.168 19.679 24.054 25.472 26.873 26.873 30.995 32.346 32.346 33.687 35.020 36.349 37.659 38.368 40.270 41.566	9.837 11.668 13.388 15.033 16.622 18.168 19.679 22.618 24.054 26.873 26.873 30.995 32.346 32.346 32.346 33.687 36.349 37.659 38.968 40.270 41.566	9.837 11.668 13.388 15.033 16.622 18.168 19.679 22.818 25.472 26.873 29.633 30.995 32.346 32.346 33.887 36.349 37.659 38.968 40.270 41.566 44.140	9.837 11.668 13.388 15.033 16.622 18.168 19.679 22.818 26.873 29.633 30.995 32.346 32.346 32.346 32.346 33.887 36.995 37.659 37.659 38.968 40.270 41.566 44.140 46.693
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.0201 115 .297 554 .872	.297 .554 .872	.297 554 .872	554	.872		1 339	1 646	2.088		2 558	2 558 3 053	2 558 3 053 3 571	3 053 3 571 4.107	3 053 3 053 3 571 4.107 4.660	3 053 3 571 4.107 4.229	3 053 3 053 3 571 4.107 4.660 5.812	3 053 3 053 3 571 4.107 4.660 4.229 5.812	3 053 3 571 4.107 4.660 4.229 6.408 7.015	3 053 3 057 4 107 4 660 4 229 6 408 6 408 7 015	3 053 3 053 3 571 4.107 4.229 6.408 7.015 7.633	3 053 3 053 3 571 4 .107 4 .229 6 .408 7 .015 7 .015 8 .260	3 053 3 571 4.107 4.229 6.408 7.015 7.633 8.260 8.897	3 053 3 571 4.107 4.660 4.229 5.812 6.408 7.015 7.633 8.260 8.897	3 053 3 571 4.107 4.660 4.229 5.812 6.408 7.015 7.633 8.260 8.897 9.542	3 053 3 571 4 107 4 660 4 229 6 408 7 015 7 633 8 260 8 8 8 9 7 9 542 10 196	3 053 3 053 3 571 4 107 4 660 4 229 5 812 6 408 7 015 7 633 8 260 8 8 9 7 9 5 4 2 10 196 10 196 11 5 2 4	3 053 3 571 4.107 4.660 4.229 6.408 7.015 7.015 7.015 7.015 1.0196 10.196 12.879	3 053 3 571 4.107 4.660 4.229 5.812 6.408 7.015 7.015 7.015 1.0196 10.196 11.524 12.198	3 053 3 571 4.107 4.660 4.229 5.812 6.408 7.015 7.633 8.260 8.897 9.542 10.196 11.524 12.198 13.565
<u> </u>						_	-	2	N		<u>س</u>	м ю	ω ω 4	w w 4 4	w w 4 4 4	w w 4 4 4 m	w w 4 4 4 10 10	w w 4 4 4 10 10 1	w w 4 4 4 10 10 11 11	w w 4 4 4 10 10 11 11 11	6 6 4 4 6 6 6 7 7 8 8	6 6 4 4 4 10 10 12 12 12 12 12 12 12 12 12 12 12 12 12	6 6 4 4 4 10 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1	w w 4 4 4 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	8 8 4 4 4 8 8 V V R 8 9 0 0 1 1 1	6 6 4 4 4 0 6 V V 8 8 9 0 0 1 1 4	8 8 4 4 4 8 8 7 7 8 8 8 8 9 0 0 1 1 2 2 2 3	8 8 4 4 4 8 8 7 7 8 8 8 9 0 0 1 1 4 2 E	8 8 4 4 4 8 8 7 7 8 8 8 9 0 0 1 1 2 2 E 4
0/ 6/ 4/ 10	w 4 10	4 ro	5	,	9	1	8	6	<		o ←	o ← 0	o ⊬ 01 6	0 6064	o ← 01 62 4 70	o ← a c 4 c o	0 + 0 6 7 6 9 7	0 + 0 6 4 6 9 7 8	0 - 9 6 4 6 6 7 8 6	0 4 2 8 4 3 5 4 6 0	0 + 2 8 4 4 9 7 8 6 0 +	0 + 2 5 5 4 3 3 5 5 7 8 8 9 9 8 4 3 9 5 7 8 8 9 9 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9	33 33 33 33 33 33 33 33 33 33 33 33 33	0 + 2 8 8 4 9 9 4 8 8 8 9	0 + 2 & 6 & 9 & 4 & 9	0 + 2 & 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0 1 2 5 5 7 5 9 7 8 6 0 0 1 2 5 7 9 7 9	0 - 2 6 7 4 4 9 7 8 6 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	12 12 13 14 14 15 16 16 16 16 16 16 16 16 16 16 16 16 16

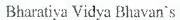
Area Under Standard Normal Curve



The table gives the area under the standard normal curve from z = 0 to $z = z_1$ which is the probability that z will lie between z = 0 and $z = z_1$.

0000			3	90	20.	8 0.	.07	80.	60
0398	0040	0800	.0120	.0160	9810.	.0239	.0279	0319	.0359
93	0438	.0478	7150.	.0557	9690	9690	.0675	0714	0753
	8832	.0871	.0910	.0948	7860.	.1026	1064	.1103	1141
1179	1217	.1255	1293	.1331	.1368	.1406	.1443	1480	1517
1554	1591	.1628	1664	1700	.1736	.1772	1808	1844	1879
1915	1950	.1985	2019	.2054	.2088	.2123	.2157	2190	2224
2257	.2291	.2324	2357	.2389	.2422	.2454	2486	2517	2549
2580	2611	.2642	.2673	.2703	.2734	.2764	2794	2823	2852
2881	.2910	.2939	.2967	.2995	.3023	.3051	3078	3106	3133
3159	.3186	.3212	.3238	.3264	.3289	.3315	3340	3365	3389
3413	.3438	.3461	.3485	3508	.3531	3554	.3577	3599	3621
3643	.3665	3686	.3708	.3729	.3749	.3770	.3790	.3810	3830
3849	.3869	.3888	3907	.3925	.3944	3962	.3980	3997	4015
.4032	4048	.4066	.4082	4089	.4115	.4131	4147	.4162	4177
4192	4207	.4222	.4236	.4251	.4265	4279	4292	.4306	4319
4332	4345	.4357	.4370	.4382	4394	.4406	4418	4429	4441
4452	.4463	.4474	4484	.4495	.4505	.4415	.4525	.4535	4545
4554	.4584	.4573	.4582	.4591	.4599	.4608	.4616	.4625	4633
4641	4649	.4656	4884	.4671	.4678	.4686	.4693	.4699	4706
4713	4719	.4726	4732	.4738	4744	.4750	.4756	4761	4767
4772	.4778	.4783	4788	.4793	4798	4803	4808	4812	4817
.4821	.4826	.4830	4834	.4838	.4842	4846	4850	4854	4857
.4861	4864	.4868	.4871	.4875	.4878	4841	4884	4887	4890
4893	4896	4898	.4901	4904	.4906	4909	4911	4913	1016
4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	4934	4936
4938	4940	.4941	4943	.4945	.4946	4948	4949	405.1	4050
4953	4955	.4956	.4957	.4959	.4560	4961	4962	4963	7064
4965	.4966	.4967	.4968	.4969	4970	4071	4072	4073	4904
4974	.4975	.4976	4977	4977	4978	4970	0707	4000	4974
4981	.4982	.4982	.4983	.4984	.4984	.4985	4985	4986	4986
4987	4987	.4987	.4988	.4988	.4989	4989	4989	4990	4990

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

Program: CIVIL

S. Y. A. Tech (G'G') Duration: 03 Hours

Course Code: BS-BTC401

Maximum Points: 100

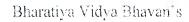
Course Name: PROBABILITY & STATISTICS

Semester: IV

Attempt any five out of seven questions

Use of scientific non-programmable calculator is allowed.

QN O.	QUESTION	PO IN TS	СО	BL	PI
QI a)	If the mean of a binomial distribution is 3 and the variance is $\frac{3}{2}$, find the probability of obtaining at least 4 success.	06	1	2	2.1.3
QI b)	Given below is the probability distribution of a drv x with mean=16 then find 'a' & 'b' and variance of x X 8 12 16 20 24	06	3	111	1.1.2
	P(x) 1/8 a b 1/4 1/12				
QIc)	Show that the correlation coefficient r lies between -1 and 1.	08	1	2	2.3.1
QII a)	The mean weight of 500 male students at a certain college is 151 lb and standard deviation is 15 lb. Assuming that the weights are normally distributed, find how money students weigh i) Between 120 & 155 lb ii) More than 185 lb	10	1	2	2.1.4
QII b)	In an examination marks obtained by students in mathematics, physics and chemistry are normally distributed with means 51,53 and 46 with standard deviations 15,12,16 respectively. Find the probability of securing total marks (i) 180 or more (ii) 90 or below	10	2	2	2.3.1
QIII a)	Two bad eggs are mixed accidently with 10 good ones. Find the probability distribution of the number of bad eggs in 3, drawn at random, without replacement from this lot.	10	3	2	1.1.2
QIII	The sales-data of an article in six shops before and after a special promotional campaign are as under	10	1	2	1.1.1







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

ENDSEM-REEXAMINATION JULY-2022

b)	Shops	A	В	С	D	E	F	<u> </u>		1	
,	Before	53	28	31	48	50	42				
	Campaign										
	After	58	29	30	55	56	45				
	Campaign	paign be judge	d to be a cu	coose at 5%	LOS						
	Can the camp	bargii de judget	u to be a sui	JCESS at 3 /0	103.					-	
QIV	The probability that a smoker aged 25 years will die before							06	1	3	2.3.1
a)	reaching the age of 30 years may be taken a 0.018. Out of a							1		2.5.1	
ш)	group of 400 smokers, now aged 25 years, what is the										
	probability that 2 smokers will die within the next 5 years?										
QIV								06	2	2	1.1.3
b)	Prices of shares of a company on different days in a month were found to be 66, 65, 69, 70, 69, 71, 70, 63, 64 and 68.					00	2	2	1.1.5		
U)	Discuss whether the price of shares to be 65.										
QIV	Compute spearman's rank coorelation coefficient for the						08	1	2	2.3.1	
c)	following of										
	X 10 12 18 18 15 40										
	Y 12 18 25 25 50 25										
		1 12 10	2.5	23 30							
QV	Fit a binomial distribution for the following data and compare the theoretical frequencies with the actual ones:							10	1	1	2.3.1
a)											
	X	0 1		3 4	5						
	f 2 14 20 34 22 8										
QV	Investigate the association between the darkness of eyecolour in						10	3	2	1.1.1	
b)	father and son from the following data										
	Colour of father's eyes										
	Dark Not Dark										
	Darl	k(Son)	48		90		······································				
	Not	Dark(Son)	80		78	2					
	Total 120 072					1					
	Total 128 872										
					· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		1 1 -		
QVI	The mean life of sample of 10 electric light bulbs was found to the 456 hours with standard deviation of 423 hours. A second sample of 17 bulbs chosen from a different batch showed by						06	2	$\frac{1}{1}$	1.1.3	
a)									1		
										_	



SARDAR PATEL COLLEGE OF ENGINEERING

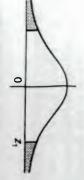


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ENDSEM- REEXAMINATION JULY-2022

					-	-					98 hou vo bato					
QVI			own 26			··					10 04.0		06	1	3	2.1.3
b)	·	арр	peared		1	2	3		4	5	6					
	Fr	equen	су		40	32	28	Ţ	50	54	60					
	Show	that t	he die	is bias	ed		<u> </u>	J								
QVI	Calci	ulate l	Karl Pe	earson	's co	efficie	nt o	f cor	relatio	on f	or the	· · · · · · · · · · · · · · · · · · ·	08	3	3	2.3.1
c)	follo	wing	data:													
			X	78		89	9	9	60)	59	79				
			Y	125		137	1	56	11	2	107	136				
QVI	į	•		ributic	n for	the f	ollo	wing	data	and	also te	est the	10	3	3	2.1.4
I a)	good	ness o	7						-						ļ	
		X	0	1	2	3	4	5								
		f	142	156	69	27	5	1								
QVI		L	<u> </u>	1	1	1							10	3	2	1.1.3
Ib)	In a p	partial	lly des	troyed	labo	ratory	rec	ord c	of an a	inaly	ysis of					
	corre	lation	data,	the fol	llowi	ng res	ults	only	are le	egib	le:					
	Varia	ance o	of $X =$	9												
	Regr	essior	n equat	ions:		8x -	-10	y + 60	6 = 0							
						40x	-1	8y =	214							
		Wł	nat are													
		i.	M	lean, v	alue	of x a	nd y	,								
		ii.	St	andar	d dev	iation	of y	/ .								
		iii.	C	oeffici	ent o	f corr	elati	on b	etwee	n x	and y					

Percentage Points of t- distribution



P(|t| > 1.812) = 0.1For $\Phi = 10$ d. o. f. Example

3	. 120				200	200	22.	26	20	2 2	2 23	22	21	20	19	18	17	16	5	14	: ಪ	ಸ	11	10	9	00	7	6	CTT	4	ω	N		0/7
1.282	1.289	1.296	1.303	1.310	1.311	1.313	1.314	1.315	1.316	1.318	1.319	1.321	1.323	1.325	1.328	1.330	1.333	1.337	1.341	1.345	1.350	1.356	1.363	1.372	1.383	1.397	1.415	1.440	1.476	1.533	1.638	1.886	3.078	0.20
1.645	1.658	1.671	1.684	1.697	1.699	1.701	1.703	1.706	1.708	1.711	1.714	1.717	1.721	1.725	1.729	1.734	1.740	1.746	1.753	1.761	1.771	1.782	1.796	1.812	1.833	1.860	1.895	1.943	2.015	2.132	2.353	2,920	6.314	0.10
1.960	1.980	2.000	2.021	2.042	2.045	2.048	2.052	2.056	2.060	2.064	2.069	2.074	2.080	2.086	2.093	2,101	2.110	2.120	2.131	2.145	2.160	2.179	2.201	2.228	2.262	2.306	2.365	2.447	2.571	2.776	3.182	4.303	12.706	0.05
2.325	2.358	2.390	2.423	2.457	2.462	2.467	2.473	2.479	2.485	2.492	2.500	2.508	2.518	2.528	2.539	2.552	2.567	2.583	2.602	2.624	2.650	2.681	2.718	2.764	2.821	2.896	2.998	3.143	3.365	3.747	4.541	6,965	31.812	0.02
2.576	2.617	2.660	2.704	2.750	2.756	2.763	2.771	2.779	2.287	2.797	2.807	2.819	2.831	2.845	2.861	2.878	2.898	2.921	2.947	2.977	3.012	3.055	3.106	3,169	3.250	3.355	3,499	3.707	4.032	4.604	5.841	9.925	63.657	0.01

Applied Mathematics - IV (CIVII / Const. / Prod.)

(**=**)

Statistical Tables

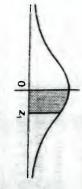
Percentage Points of χ^2 - Distribution



 $P(\chi^2 > 15.99) = 0.10$ For $\Phi = 10 \text{ d. o. f.}$ Example

30	3 6	y န	28	27	26	25	24	3	3 8	3 2	20) - 0 4	i ā	<u>.</u>	1 6	: d	14	: 3	2	-	Š	.	၁ ၁	· ~	ော	ن ن	4	ω	N	_	0
14.953	14,200	14 256	13 595	12.879	12.198	11.524	10.856	10.196	9.542	8.897	8.260	7,633	6107	5.408	5.812	4.229	4.660	4.107	3 571	3 053	7,000	2,000	3 000	1 339	872	.554	.297	.115	.0201	000157	AR. H.O.
18 493	807.71	0.820	000	16 15	15.379	14.611	13.848	13.091	12,338	11.591	10.851	10,117	9.390	8.672	7.962	7.261	6.571	5.892	5 226	4 575	3.940	3.325	2.733	2.167	1.635	1.145	711	352	.103	.00393	0.95
29,336	28.336	27.336	20.000	26.236	25.336	24.337	23.337	22.337	21.337	20.337	19.337	18.338	17.338	16.338	15.338	14.339	13.339	12.340	11.340	10.341	9.340	8.343	7.344	6.346	5.348	4.351	3.357	2.366	1.386	.455	0.50
40.258	39.087	37.916	30.74	20.00	200	34.382	32.196	32.007	30.813	29.615	28.412	27.204	25.989	24.769	23.542	22.307	21.064	19.812	18.549	17.275	15,987	14.684	13.362	12.017	10.645	9.236	7.779	6.251	4.605	2,706	0.10
43 773	42.557	41.337	40.113	38.885	200	37 650	36.415	35,172	33.924	32.671	31.410	30.144	28.869	27.587	26.296	24.996	23.685	22.362	21.026	19.675	18.307	16.919	15.507	14.067	12.592	11.070	9.488	7.815	5.991	3.841	0.05
47 000	46.893	45.419	44.140	41.858	41.000	41 100	40 270	38.968	37.659	36.349	35 020	33.687	32.346	30.995	29.633	28.259	26.873	25.472	24.054	22.618	21.161	19.679	18.168	16.622	15.033	13.388	11.668	9.837	7.824	5214	0.02
50.000	49 598	48.278	46.963	45.642	44.314	72 800	1000	41 638	40.289	38.932	37.566	36.191	34.805	33.409	32.000	30.578	29.141	27.688	26.217	24.725	23 209	21.666	20.090	18.475	16.812	15.086	13.277	11.341	9.210	6.635	0.01

Area Under Standard Normal Curve



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The table gives the area under the standard normal curve from z=0 to $z=z_1$ which is the probability that z will lie between z=0 and $z=z_1$.

4990	4990	4989	4989	.4989	.4988	.4988	.4987	.4987	4987	3.0
4986	.4986	.4985	.4985	.4984	.4984	.4983	.4982	.4882	1064	ä
4981	.4980	.4979	.4979	.4978	.4977	.4977	.49/6	0/84	4/64	2 6
4974	.4973	.4972	.4971	.4970	.4969	.4968	/08th	1000	4074	0
4964	.4963	.4962	.4961	.4560	.4868	1984	. 4000	1000	4065	7
4952	4951	.4949	.4948	0404.	. 1010	10.0	1056	4955	4953	2.6
			200	4016	4045	4943	.4941	.4940	.4938	25
4936	.4934	.4932	.4931	.4929	.4927	.4925	.4822	076tr	0	ĵ
4916	.4913	.4911	.4909	.4906	.4904	1064	000	1000	1010	2
4890	.4887	.4884	.4841	.48/8	.40/0		4000	4906	4893	<u>د</u>
485/	4004	.4000	. 10	1000	1075	1971	4888	4864	.4861	22
100	4064	4950	4846	4845	4838	.4834	.4830	.4826	.4821	2.1
4917	4812	4808	.4803	.4798	.4793	.4788	.4783	4778	.4772	2.0
4767	.4761	.4756	4750	.4744	.4738	.4732	.4726	.4/19	4/13	ď
4706	.4699	.4693	.4686	.4678	.4671	.4864	.4656	.4048	.404	0
4633	.4625	.4616	.4608	.4599	.4591	4582	.4573	.4584	.4554	; ;
4545	.4535	.4525	.4415	.4505	.4495	.4484	44/4			4 6
4441	.4429	.4418	.4406	.4394	.4382	.4370	.4357	.4345	7002	ם מ
4319	4000	7876	46.0	.7200						1
3	4306	1202	4270	4265	4251	4238	.4222	.4207	.4192	4
4177	4165	4147	4131	.4115	.4089	.4082	.4066	.4049	.4032	3
4015	3997	.3980	.3962	.3944	.3925	.3907	.3888	3869	.3849	K
3830	.3810	.3790	.3770	.3749	.3729	.3708	.3686	.3685	.3643	Ξ
3621	3599	.3577	3554	.3531	.3508	.3485	.3461	.3438	.3413	1.0
3389	3365	.3340	_3315	.3289	.3264	.3238	.3212	3186	3159	
3133	3106	.3078	.3051	.3023	.2995	.2967	.2939	2910	1882	0.00
2852	.2823	.2794	.2764	.2734	.2703	.2673	.2642	.2611	.2580	2 2
2549	.2517	.2486	.2454	.2422	.2389	.2357	.2324	.2291	.2257	0.6
2224	.2190	.2157	.2123	.2088	.2054	.2019	.1985	.1950	.1915	0.5
1879	.1844	1808	.1772	.1736	.1700	1664	.1628	1591	1554	4
.1517	1480	.1443	.1406	.1368	.1331	.1293	.1255	.1217	.1179	0.3
1141	.1103	.1084	.1026	.0987	.0948	.0910	.0871	8832	.0793	0 0
0753	.0714	.0675	.0636	.0596	.0557	.0517	.0478	.0438	.0398	0.1
.0359	.0319	.0279	.0239	.0199	.0160	.0120	.0080	.0040	.0000	0.0
.08	.00								-	

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai - 400058.

D.S.A. (AY 2021-22), End Semester Examinations, July 2022
D. J. Y. J. Tell (GV11) Lem 19

Program: B.Tech. Civil Engineering

Course Code: PC-BTC403

Course Name: Concrete Technology

Duration: 3 Hour Maximum points: 100

Semester: IV

Instructions:

1. Attempt any FIVE questions out of SEVEN questions

2. Answers to all sub questions should be grouped together

3. Draw neat diagrams wherever required

4. Assume suitable data if necessary and state the clearly.

Que. No.	Descript	tions								Points	со	BL	PI
	(a) What types of c						ement? Er	nlist diffe	ent	10	3	2	1.2.1
Q1	(b) How	you wil	l measi	ire the	corros	ion of rei	nforcemen	nt in conc	rete?	4	3	4	2.1.2
	(c) State t	he ben	efits of	RMC o	over co	nvention	al concret	ing.		6	1	2	1.2.1
		you werties?	ill eval	uate th	e suita	ibility of	cement b	ased on p	hysical	10	1	3	2.3.1
	Finer	ess me		and G	rading	Zone in	alysis of the tabul			6	1	3	1.3.2
	Sieve size	10 mm	4.75 mm	2.36 mm	1.18 mm	600 micron	300 micron	150 micron	pan				
	weight retained in gm.	00	12	22	170	396	215	165	20				

	IS SIEVE Designation		PERCENTAGE I	ASSING FOR		_
	•	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV	
	10 mm	100	100	100	100	
	4·75 mm	90-100	90-100	90-100	95 -100	
	2·36 mm	60-95	75-100	85-100	95-100	
1	1·18 mm	30-70	55-90	75-100	90-100	
	600 micron	15-34	35-59	60-79	80-100	
1	300 micron	5-20	8-30	12-40	15-50	
	150 micron	0-10	0-10	0-10	0-15	
C.	Distinguish between L	ight weight and High	density concrete	4	2 2 2	2.3.1

		cement concrete of M3 2019 for the following	5 grade using guideline data.	s 15	2	2	2.3.1
	Exposure condition: Moderate	Maximum size of aggregate —20 mm	Method of placement — Chute	Specific aggregate	•	of 20	mm
Q3	Strength of cement OPC —53 MPa	Workability — slump, 80 mm	Type of coarse aggregate — angular coarse aggregate	Specific aggregate		of 10	mm
	Refer data of Que. 2b, for Zone of sand	Total moisture content in 20, 10 mm 0.5%	Total moisture content in fine aggregate — 3.0 %	Specific aggregate	gravity — 2.65	of	fine
	(b) What you know aborder of concrete		t helps to Improve	5	3	4	2.1.2
	related to the properties	s of material as given in	Method; consider the of Que.No.3a. d concrete over ordin		2	3 2	2.3.1
Q4	concrete.	•	orkability using flow ta	4	2	3	1.2.1
0.	(a) Explain the mechan (b) Describe the proce	dure for measuring pH	of concrete? Highlight	the 6	1 1	2 3	2.1.2
Q5	-	ame from durability po oncrete? Discuss variou	s applications of the sar	ne. 6	2	2	2.3.1
Q6	(a) Discuss in detail pr (b) What do you mean (c) What is NDT? Wh	t by cold whether concr		8 6 6	1 3 2	2 3 3	2.3.1 1.3.2 1.4.1
Q7	i) DOE method ii) Low heat (iii) Bulking of iv) Accelerato v) Workabilit		Four)	5 5 5 5 5 5	3 2 3 1 1 3	2 2 2 2 2 2 2	1.3.1 1.3.1 1.3.1 1.3.1 1.3.1 1.3.1

. . .

Table 1,2 and 3 for ACI Method Concrete Mix Design

(1) Dry Bulk Volume of coarse aggregate/ unit volume of concrete as per ACI 211.1-91

Maximum size of aggregate	Bulk volume c	of dry rodded Ca fineness modu	Bulk volume of dry rodded CA /unit volume of concrete for fineness modulus of sand of	f concrete for
FM	2.4	2.6	6 OC	3.00
10	0.5	0 48	046	0 44
12.5.	0.59	0.57	0.55	0.53
26 (25,40, 50,7 0)	0 66	0.64	0.62	0.60
150	.87	0.85	0.83	0.81

1 5	35 (30,25,20)	40	45	MPa	Average compressive strength at 28 days
0.8	0.48	0	0.38	Non air entrained concrete	Effective water/ce
0.71	0,4	Cappelline and a control of the cont		All entrained concrete	Effective water/cement ratio (by mass)

	(3)
strength for special exposure conditions	Requirements of ACI-318-89 for w/c ratio &

					ater/ce
0./-	0,4	E		Parameters, Control of the Control o	ater/cement ratio (by mass)
	reinforced concrete exposed to de icing salts, see water	Concrete exposed to freezing in a moist condition	(a) Exposed to fresh water (b) Exposed to sea water	Concrete intended to be watertight	Exposure condition
	4	0.45	0.45		Maximum w/c ratio, normal density aggregate concrete
	٤	3 8	25 30		Minimum design strength. low density aggregate concrete MPa

Table 4,5 and 6 for ACI Method Concrete Mix Design

(4) Recommended value of slump for various types of construction as per ACI 211.1-91

Mass concrete	Pavements & slabs	Building columns	Beams & reinforced walls	Plain footings, substructure wall	Reinforces foundation walls & footings	Type of construction
20-80	20-80	20-100	20-100	20-80	20-80	Range of slump (min)

(5) Approximate requirements for mixing water & air content for different workabilities & nominal maximum size of aggregates as per ACI211.1-91

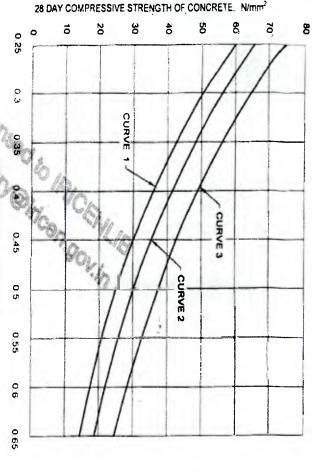
	Non a	Non air entrained concrete	ncrete	
Wurkability	Water conten	Water content, korn 3 of core gote for indicted maximum	CIOTO TOI INDICH	od maximum
200	aggregate size	Œ	New Services	An agreement of the contract o
Content	10 mm	12.5 mm	ara by	150 mm
(Siump)	(25, 40, 50, 70)	3		
30 -50 mm	205	200	ž	125
80-100 mm	225	215	200	140
150-180 mm	240	230	210	
Approx entrapped air (%)	ω l	2.5	2	0.2

(6) First estimate of density of fresh concrete as per ACI 211.1-91

aggregate (mm)		10	12.5 (20,25.40,50)	20	150
hirst estimate of density of fresh concrete	No areamanned am	2285	2315	2355	2505
ires concrete	Air entrained kg/m ¹	2190	2235	2280	2435

Reference Tables for IS 10262:2019 Method of Concrete mix design

IS 10262 : 2019



Curve 3 for expected 28 days compressive strength of 33 and < 43 N/mm² Curve 3 for expected 28 days compressive strength of 43 and < 53 N/mm² Curve 3 for expected 28 days compressive strength of 53 N/mm² and above FREE WATER CEMENT RATIO

SELON

IS 10262 : 2019

Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50 (Clause 5.5)

2 2

Nominal Maximum Size of Aggregate

Volume of Coarse Aggiegate per Unit Volume of Total Aggiegate for Different Zones of Fine

8 5 B Zone IV 0.66 0.54 (3) Zone III 0 64 0.52 Œ Zone II 0.62 0.50 3 Zone I 0.60 0.48 6

1 Volumes are based on aggregates in saturated surface dry condition.

2 These volumes are for crushed (angular) aggregate and snitable adjustments may be made for other shape of aggregate

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0 Ţ,

need lesser fine aggregate content. In that case, the coarse aggregate volume shall be suitably increased 3 Suitable adjustments may also be made for time aggregate from other than natural sources, normally, crushed sand or nuxed sand may

have been made to ascertain the suitability of proposed nux proportious 4 It is recommended that fine aggregate conforming to Grading Zone IV, as per IS 383 shall not be used in reinforced concrete unless tests

Water content corresponding to saturated surface dry agore

Table 5 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

2			•				•
		Minimum Ceinent Content kg/m³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete	Minimum Content Content kp/m³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete
=	(2)	9	(4)	છ	3	9	8
=	Mild	220	0.60	+	. .	0.55	X 20
=	Moderate	240	0.60	Z Z	300	08.0	M 23
3	Severe	250	0.50	M 20	320	0.45	X
(V)	Vary severe	260	0,45	M 20	3	0.45	M 35
ડ	Extreme	280	0.40	M 25	35	0.40	X 6
NOTE	<u>F</u>						

not exceed the limit of pozzolona and sing specified in IS 1489 (Part 1) and IS 455 respectively additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do then an one many is accorded to the graves of tentant and a middle of solding mentioned to 2.7. The

2 Minimum grade for plain concrete under mild exposure condition is not specified

% 2 Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Nominal Maximum Size of Aggregate HIII (Clause 5.3) Aggregate Water Content" 10

8

of Aggregate

of Volume of Concrete

9

5

Nominal Maximum Size

Entrapped Air, as Percentage

Table 3 Approximate Air Content

(Clause 5.2)

5.2.1 The actual values of air content can also adopted during mix proportioning, if the site data least 5 results) for similar mix is available



Sardar Patel College of Engineering

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End Semester Examinations, May 2022

S. Y. B. Told (Gvil) Lem I

2115/22

Program: B.Tech. Civil Engineering

Course Code: PC-BTC403

Course Name: Concrete Technology

Duration: 3 Hour Maximum points: 100

Semester: IV

Instructions:

1. Attempt any FIVE questions out of SEVEN questions

2. Answers to all sub questions should be grouped together

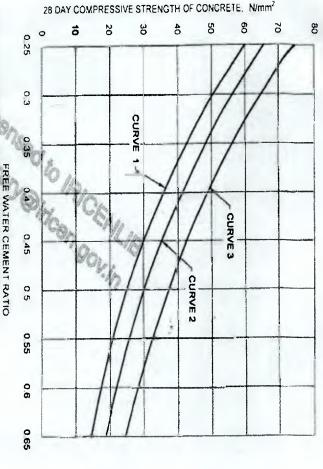
3. Draw neat diagrams wherever required

4. Assume suitable data if necessary and state the clearly.

Que. No.	Descriptions			Points	со	BL	PI
	batching plant and thei	r utility.	fferent functional units		3	2	1.2.1
Q1	factors that affect the ra	ate of carbonation.	rete? Discuss the vario	-	3	4	2.1.2
	(c) State the advantage			5	1	2	1.2.1
	their sources.		mineral admixtures and	5	1	3	1.3.2
	b. Design concrete fo 10262:2019 for the	r M30 grade using guid following data.	elines given in IS	15	2	2	2.3.1
Q2	Exposure condition: Moderate	Maximum size of aggregate —20 mm	Method of placement — Chute	Specific g aggregate -		of 20	mm
QZ	Strength of cement OPC50 MPa	Workability — slump, 50 mm	Type of coarse aggregate — angular coarse aggregate	Specific g aggregate -		of 10	mm
	Zone of sand — II	Total moisture content in 20, 10 mm 0.3%	Total moisture content in fine aggregate — 2.5 %	aggregate -	gravity – 2.62	of	fine
	(a) What is High Per characteristics of HPC.	formance concrete (H.	PC)? Discuss the vari	ous 10	3	4	2.1.2
Q3	(b) What you know abo detail the procedure for			n in 10	2	2	2.4.2
	(a) Design concrete for related to the properties	•	•	lata 10	2	3	1.3.1
Q4	(b) What is fiber reinf	_	-	ary 6	1	2	2.3.1
	concrete? (c) Differentiate between	een mineral and chemic	al admixtures.	4	2	3	1.2.1

Q5	(a) What is underwater concreting? Explain Tremie method in detail.(b) How light weight concrete is manufactured?(c) Highlight the salient features of Road Note No.4 method.	10 5 5	1 1 2	2 3 2	2.1.2 1.3.1 2.3.1
Q6	 (a) Enlist the various stages of concrete production and discuss compaction of concrete in detail. (b) What is Polymer concrete? State the applications of the same. (c) How GGBS improve the performance of concrete? 	10 5 5	3 2	3 3	2.3.1 1.3.2 1.4.1
Q7	Write explanatory notes on the following (any Four) i) Hot weather concrete ii) Sulphate Resisting Cement iii) Transit Mixer iv) size and shape of aggregates v) Durability of Concrete vi) Retarders	5 5 5 5 5 5	3 2 3 1 1 3	2 2 2 2 2 2 2	1.3.1 1.3.1 1.3.1 1.3.1 1.3.1 1.3.1

Reference Tables for IS 10262:2019 Method of Concrete mix design



FREE WATER CEMENT RATIO

Onve 1 for expected 28 days compressive strength of 33 and < 43 N/mm²

Curve 2 for expected 28 days compressive strength of 43 and < 53 N/mm²

Curve 3 for expected 28 days compressive strength of 53 N/mm² and above

IS 10262: 2019

MOTES

Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50

(3	
5	3	
,	v	
	2	

Nominal Maximum Size Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine

? <u>s</u>

		mm			1		
	*		Zone IV	Zone III	Zone II	Zone I	
1.6	(I)	(2)	(3)	(4)	(5)	(6)	
	1)	10	0.54	0.52	0.50	0.48	
	E)	20	0.66	0.64	0.62	0.60	
	iii)	40	0_73	0.72	0.71	0.69	
	NOTES						

I Volumes are based on aggregates in saturated surface dry condition.

2 These volumes are for crushed (angular) aggregate and suitable adjustments may be made for other shape of aggregate.

3. Suitable adjustments may also be made for fine aggregate from other than natural sources, normally, enished sand or nuxed sand may need lesser fine aggregate content. In that case, the coarse aggregate volume shall be suitably increased.

4 ft is recommended that fine aggregate conforming to Grading Zone IV. as per IS 383 shall not be used in reinforced concrete unless tests have been made to ascertain the suitability of proposed mix proportions.

Table 5 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

\$ Z	Exposure		Plain Concrete			Reinforced Concrete	ਜ
		Minimum Cement Content kg/m²	Maximum Pree Water- Cement Ratio	Minimum Grade of Concrete	Minimum Coment Content kg/m ¹	Maximum Free Water- Cernest Ratio	Minimur Grade of Concrete
Ξ	(2)	3	(છ	6	9	\$
೮	Mild	220	0.60	1	30	0.55	M 20
ij	Moderate	240	0.60	Z X	. 7	0.50	M 25
=	Severe	250	0.50	M 20	320	0.45	95. N
3	Very severe	260	0.45	X 20	<u></u>	0.45	M 35
ડ	Exireme	280	0.40	M 25	360	0.40	X 8
7.	NOTES						

Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Aggregate

Minimum grade for plain concrete under mild exposure condition is not specified

not exceed the limit of pozzolona and slag specified in IS 1489 (Part 1) and IS 455 respectively

1 Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in 5.2. The additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do

	_	-	
		3	
-	2	1	
ζ	2		
•	O		
	_	1	
`	_	2	

Utility contant corresponding to commend suchoas list on the		
165	40	E)
186	20	۳
208	10	<u>ت</u>
9//	(2)	(3)
	מונומ	
Ke M	Aggregate	No.
Water Content	Nominal Maximum Size of	2

Table 3 Approximate Air Content (Clause 5.2)

2	Nominal Maximum Size	Entrapped Air. as
0	of Aggregate	Percentage
	mm	of Volume of Concrete
	(2)	<u> </u>
=	10	
Ξ	20	<u> </u>
-51	40	8.0

5.2.1 The actual values of air content can also adopted during mix proportioning, if the site data least 5 results) for similar mix is available

Table 1,2 and 3 for ACI Method Concrete Mix Design

(1) Dry Bulk Volume of coarse aggregate/ unit volume of concrete as per ACI 211,1-91

Maximum size of aggregate	Bulk volume c	Bulk volume of dry rodded CA /unit volume of concrete for fineness modulus of sand of	\unit volume o	f concrete for
FM	2.4	2.6	2.8	3.00
10	0.5	0.48	0.46	0.44
12.5.	0.59	0.57	0.55	0.53
20 (25,40,50,70)	0.66	0.64	0.62	0.60
150	.87	0.85	0.83	0.81

Average compressive	Effective water/cer	Effective water/cement ratio (by mass)
strength at 28 days		
MPa	Non air entrained concrete	Air entrained concrete
45	0.38	and the second s
40	0.43	
35 (30,25,20)	0.48	0.4
15	0.8	0.71

	$\overline{\omega}$
strength for special exposure conditions	3) Requirements of ACI-318-89 for w/c ratio &
	1

0.71	0.4			1=1	ater/cement ratio (by mass)	
- Annual Control of the Control of t	For corrosion protection of reinforced concrete exposed to de icing salts, see water	Concrete exposed to freezing in a moist condition	(b) Exposed to fresh water	Concrete intended to be watertight	Exposure condition	
	04	0.45	0.45		Maximum wic ratio, normal density aggregate concrete	
	ນ	ક્ષ	25 30		Minimum design strength, low density aggregate concrete MPa	

Table 4,5 and 6 for ACI Method Concrete Mix Design

(4) Recommended value of slump for various types of construction as per ACI 211.1-91

Mass concrete	Pavements & slabs	Building columns	Beams & reinforced walls	Plain footings, substructure wall	Reinforces foundation walls & footings	Type of construction
20-80	20-80	20-100	20-100	20-80	20-80	Range of slump (mm)

<u>a a ≥ -1 ∞</u>

(5) Approximate requirements for mixing water & air content for different workabilities & nominal maximum size of aggregates as per ACI211.1-91

	Non	Non air entrained concrete	concrete	
vorkability r air	Water content, aggregate size	nt, kg/m3 of co ize	procede for indi	Water content, kg/m3 of concrete for indicted maximum aggregate size
ontent	10 mm	12.5 mm	10 m/m	150 mm
Slump)	(25, 40,50,70)	70)		
0-50 mm	205	200	185	125
0-100 mm	225	215	200	140
50-180 mm 240	240	230	210	
pprox ntrapped ir (%)	ω	2.5	2	0.2

3 8888

(6) First estimate of density of fresh concrete as per ACI 211.1-91

(2) (20,23,40,30)	2355
	2280
	2355



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Munshi Nagar, Andheri (West), Mumbai - 400058.

S. Y. A. Re-examinations, July 2022

S. Y. A. Tech (Wall) Lem IV

Program: B.Tech. Civil Engineering

Course Code: PC-BTC403

Course Name: Concrete Technology

Duration: 3 Hour

Maximum points: 100

Semester: IV

Instructions:

1. Attempt any FIVE questions out of SEVEN questions

- 2. Answers to all sub questions should be grouped together
- 3. Draw neat diagrams wherever required
- 4. Assume suitable data if necessary and state the clearly.

Que. No.	Descriptions			Points	co	BL	PI
110.	(a) How you will evalue properties?	ate the suitability of ce	ment based on physical	10	3	2	1.2.1
Q1	(b) How you will meas	ture the pH of concrete? es of RMC over ordinar		5 5	3	4 2	2.1.2 1.2.1
	a. Why segregation a	nd bleeding occurs in co	oncrete?	5	1	3	1.3.2
	b. Design concrete fo 10262:2019 for the	r M40 grade using guid following data.	elines given in IS	15	2	2	2.3.1
00	Exposure condition: Moderate	Maximum size of aggregate —20 mm	Method of placement — Chute	Specific g aggregate –	-	of 20	mm
Q2	Strength of cement OPC —50 MPa	Workability — slump, 120 mm	Type of coarse aggregate — angular coarse aggregate	Specific g aggregate –	-	of 10	mm
	Zone of sand — I	Total moisture content in 20, 10 mm 0.5%	Total moisture content in fine aggregate — 2.60 %	Specific aggregate –	gravity – 2.75	of	fine
	hardening and Hydropl	nobic cement in detail.	t? Explain Low heat, Ra explain the step by s		3	4	2.1.2
Q3	1	ed to complete the conc		10	2	2	2.4.2
	, ,	r M40 grade using ACI s of material as given in	Method; consider the	lata 10	2	3	1.3.1
Q4		vill you take into accou	nt to find the suitability	of 10	1	2	2.3.1

	(a) Explain in brief Light weight concrete, high density concrete and hot	10	1	2	2.1.2
Q5	weather concrete. (b) Discuss the applications of fiber reinforced concrete.	5	1	3	1.3.1
Q3	(c) What is retarder? Explain the need of the same in construction.	5	2	2	2.3.1
	(a) Explain any three tests to be conducted on each fresh and hardened concrete.	10	1	2	2.3.1
Q6	(b) What problem is faced during under water concreting?	5	3	3	1.3.2
Qu	(c) How volcanic ash helps to improve the performance of concrete?	5 5	2	3	1.4.1
	Write explanatory notes on the following (any Four)			11	
	i) Compaction factor test	5	3	2	1.3.1
	ii) Portland pozzolona cement	5	2	2	1.3.1
	iii) Silica fumes	5	3	2	1.3.1
Q7	iv) Batching of concrete	5	1	2	1.3.1
	v) Durability	5	1	2	1.3.1
	vi) Polymer concrete	5	3	2	1.3.1

Table 1,2 and 3 for ACI Method Concrete Mix Design

(1) Dry Bulk Volume of coarse aggregate/ unit volume of concrete as per ACI 211.1-91

150	25 40.50,70)	12.5	10	FM	Maximum size of aggregate
.87	0 66	0,59	0.5	2.4	Bulk volume c
0.85	0.64	0.57	0.48	2.6	of dry rodded CA /unit volume fineness modulus of sand of
0.83	0) (2)	0.55	0.46	2.8	Bulk volume of dry rodded CA /unit volume of concrete for fineness modulus of sand of
0.81	0.60	0.53	0.44	3.00	of concrete for

compressive strength of concrete, as per ACI211 1-91 (2) Relation between water/cen entiratio & average

Air entrained concrete	Non air entrained concrete	MPa
Effective water/cement ratio (by mass)	Effective water/cer	Average compressive strength at 28 days

strenath for speci	(3) Requirements of Ac
strength for special exposure conditions	Requirements of ACI-318-89 for w/c ratio &

	For corrosion protection of reinforced concrete exposed to de using selts, sea water	Concrete exposed to freezing in a most condition	(a) Exposed to fresh water (b) Exposed to see water	Concrete intended to be watertight	Exposure condition
0.71	0.4		•	VII dilliali ed coliciete	Effective water/cement ratio (by mass)
0	2 3	0.43	0.38	concrete	Effective water/cer

35 (30,25.20)

55

For corrosion protection of rainforced concrete exposed to de icing salts, sea water	Concrete exposed to freezing in a most condition	Concrete intended to be watertight (a) Exposed to fresh water (b) Exposed to sea water	Exposure condition
0.4	0.45	0.5 0.45	Maximum w/c ratio normal density aggregate concrete
ان	30	30 35	Minimum design strength, low density aggregate concrete MPa

Table 4,5 and 6 for ACI Method Concrete Mix Design

(4) Recommended value of slump for various types of construction as per ACI 211 1-91

Mass concrete	Pavements & slabs	Building columns	Beams & reinforced walls	Plan footings, substructure wall	Reinforces foundation walls & footings	Type of construction
20-80	20-80	20-100	20-100	20-80	20-80	Range of slump (mm)

(5) Approximate requirements for mixing water & air content for different workabilities & normal maximum size of aggregates as per ACI211 1-91

Workabilit, or an	Azis aleba (10)	98 10 15 5 (U/54 3)	What content Pgm3 of concrete for Indicted maximum aggregate size	mulixero pol
content (Slump)	(25, 40, 50,70)	12 5 mm	uku D.c	150 mm
30 -50 mm	205	200	8,5	125
80-100 mm	225	215	200	140
150-180 mm	240	230	210	The state of the s
Approx entrapped air (%)	ω	2.5	2	0.2

(6) First estimate of density of fresh concrete as per ACI 211.1-91

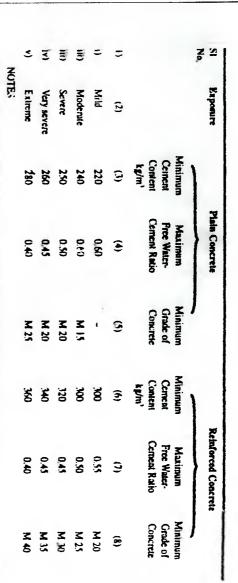
150	700	12.5 (20 25.40 50)	10		Maximum size of aggregate (mm)
2505	2355	2315	2285	Non or entrained kg m	First estimate of density of fresh concrete
2435	2280	2235	2190	Air entrained kg/m	iresh concrete

Reference Tables for IS 10262:2019 Method of Concrete mix design

Ë

Table 5 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Welght Aggregates of 20 mm Nominal Maximum Size

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)



I Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in 3.2. The not exceed the limit of pozzolona and alag specified in IS 1439 (Part I) and IS 455 respectively the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to

3 Minimum grade for plain concrete under mild exposure condition is not specified

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0		-	+-	Š	1	1	1
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20	4/1	1	***************************************		11	1	_
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	Co.	8	All.	1/	//		
0.45	30	O.	1	11	V	Ī	CURVE 3
		a.O.	1 /	1/	1		
0.45 0.5			12/	V	CURVE 2	+	-
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			11	1			
0.6			1	4-	1		_
3		1	11	1	-	***************************************	***************************************
0		1	11	1,1960,		Policipu.	
0.65							

IS 10262: 2019

Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitions Materials Ratio of 0.50

3	3
CHILITA	2
1	Š
-	-

Nominal Maximum Size Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine

N	of Aggregate		Agg	Aggregate	
		Zone IV	Zone III	Zone iI	Zone I
Ξ)	E	(3)	Ξ	S	<u> </u>
1)	10	0.54	550	0.50	0.48
	20	0 66	0.64	0.62	0.60
=	40	0.73	0.72	0.71	0.69
NOTES					

- 1 Volumes are based on aggregates in saturated surface dry condition.
- 2 These volumes are for crushed (angular) aggregate and suitable adjustments may be made for other shape of aggregate
- 3 Sunable adjustments may also be made for time aggregate from other than natural sources, normally, crushed sand or nuxed sand may need lesser fine aggregate content. In that case, the course aggregate volume shall be suitably increased
- 4 It is recommended that fine aggregate conforming to Grading Zone IV. as per IS 383 shall not be used in reinforced concrete unless tests have been made to ascertain the suitability of proposed mux proportious

Water content corresponding to saturated surface dry agercant

0 *0

0 و و ق Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Nominal Maximum Size of Aggregate 0 0 (Clause 5.3) Aggregate Water Content ***** 10

Table 3 Approximate Air Content (Clause 5.2)

adopted during mix proportioning, if the site data 5.2.1 The actual values of air content can also least 5 results) for similar mix is available



Shivaji Maharaj.

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute) Munshi Nagar, Andheri (West), Mumbai - 400058



D. J. Y. S. Tech (Gol) Lem JV

Program: B.Tech. in Civil Engineering-DSY

Class: Second Year B.Tech. (Civil)

Course code: MC-BTC 002

Name of the Course: Indian Traditional Knowledge

Date: 11 July 2022

Duration: 3 Hr.

Max. Points: 100

Semester: IV

18/7/22 Instructions: Solve ANY FIVE Questions with elaborative answers in legible handwriting.

Q. No.	Question	Points	00	BL	PI	Module
Q.1	a) Explain: 'Concept and Rule of Dharma in India since ancient times' with suitable examples.	(10)	1	II	6.1.1	1
	b) Justify: "India is the unique country with unity in diversity as its					
	core strength since ancient times" giving suitable examples.	(10)	1	VI	6.1.1	1
Q.2	a) Discuss: Spiritual enrichment of ancient Indian tradition with suitable examples.	(10)	1	I,VI	6.1.1	2
	b) Justify: "Nature is the supreme teacher (Guru)" with characteristics of any 03 elements in nature for learnings of Adi yogi Shri Dattatreya.	(10)	1	VI	6.1.1	2
Q.3	a) Explain: With two examples the greatness of wisdom of ancient indian scholars in the field of mathematics and astronomy.	(10)	2	II	6.1.1	3
	b) Discuss: Advancement in the field of science and technology in ancient India.	(10)	2	V	6.1.1	3
Q.4	a) Justify: Advancements in medicinal and healthcare practices in ancient India.	(10)	2	VI	6.1.1	4
	b) Justify: "Yoga is the key for long life with good health" in context of ancient as well as modern India.	(10)	2	VI	6.1.1	4
.Q.5	a) List: Names of various Indian classical dance forms and Describe: Any two of them with its significance.	(10)	3	I, V	6.1.1	5
	b) List: Various traditional art forms of ancient Indian and Describe: any one of them.	(10)	3	I, V	6.1.1	5
Q.6	a) Explain: Rich heritage of Indian Traditional Languages since ancient times and significance of any one language of India.	(10)	3	II	6.1.1	6
	b) Discuss: Significance and teachings of any one great epic / literature of ancient Indian tradition.	(10)	3	V	6.1.1	6
Q.7	a) Discuss: In brief, life, work, philosophy and contribution of Sant Dnyaneshwar Maharaj.	(10)	4	V	6.1.1	7
	b) Discuss: In brief, life, work and contribution of Chhatrapati Shri	(10)	4	V	6.1.1	7



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(A Government Aided Autonomous Institute) Munshi Nagar, Andheri (West), Mumbai - 400058



END SEMESTER EXAMINATION, MAY-2022

Program: B.Tech. in Civil Engineering Class: Second Year B.Tech. (Civil)

Course code: MC-BTC 002

Name of the Course: Indian Traditional Knowledge

Date: | 7May 2022 Duration: 3 Hr. Max. Points: 100

Semester: IV

Instructions: Solve ANY FIVE Questions.

Q. No.	Question	Points	00	BL	ā	Module
Q.1	a) Explain: 'Concept and Rule of Dharma in India since ancient times' with suitable examples.	(10)	1	II	6.1.1	1
	b) Justify: "India is the unique country with unity in diversity as its core strength since ancient times" giving suitable examples.	(10)	1	VI	6.1.1	1
Q.2	a) List: Names of The Vedas and Upvedas. Justify: "Vedas are the eternal source of knowledge for the entire mankid".	(10)	1	I,VI	6.1.1	2
	b) Justify: "Nature is the supreme teacher (Guru)" describing characteristics of any 03 elements in nature, learnings of Adi yogi Shri Dattatreya from these elements of nature.	(10)	1	VI	6.1.1	2
Q.3	a) Explain: With two examples the greatness of wisdom of ancient indian scholars in the field of mathematics and astronomy.	(10)	2	II	6.1.1	3
	b) Discuss: Superior Knowledge of ancient Indian sages explaining the valuable contribution of Maharshi Kanad.	(10)	2	V	6.1.1	3
Q.4	a) Explain: Any one significant medical practice and medical practitioner in ancient India.	(10)	2	II	6.1.1	4
	b) Justify: "Yoga is the key for long life with good health" in context of ancient as well as modern India.		2	VI	6.1.1	4
Q.5	a) List: Names of various Indian classical dance forms and Describe: Any two of them with its significance.	(10)	3	I, V	6.1.1	5
	b) List: Various traditional art forms of ancient Indian and Describe: any one of them.	(10)	3	I, V	6.1.1	5
Q.6	a) Explain: Rich heritage of Indian Traditional Languages since ancient times and significance of any one language of India.	(10)	3	II	6.1.1	6
	b) Discuss: Significance and teachings of any one great epic of ancient Indian tradition.	(10)	3	V	6.1.1	6
Q.7		(10)	4	V	6.1.1	7
	b) Discuss: In brief, life, work, philosophy and teachings of Bhagwan Gautam Buddha for the entire mankind.	(10)	4	V	6.1.1	7



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SIY B. RE-EXAMINATION, JULY-2022

Program: B.Tech. in Civil Engineering Class: Second Year B.Tech. (Civil)

Course code:MC-BTE 002

Name of the Course: Indian Traditional Knowledge

Date: July 2022 Duration: 3 Hr.

Max. Points: 100

Semester: IV

Q. No.	Question	Points	00	BL	Ы	Module
Q.1	a) Explain: 'Concept and Rule of Dharma in India since ancient	(10)	i	II	6.1.1	1
	times' with suitable examples.					
	b) Justify: "India is the unique country with unity in diversity as its			3.7Y	611	1
	core strength since ancient times" giving suitable examples.	(10)	1	VI	6.1.1	2
Q.2	a) Discuss: Spiritual enrichment of ancient Indian tradition with	(10)	1	I,VI	6.1.1	2
	suitable examples.	(10)	1	I, VI	6.1.1	2
	b) List: Names of Principal Vedas and Upvedas. Justify: "Vedas are	(10)	1	1, 11	0.1.1	2
	the eternal source of knowledge for mankind since time in memory".	(10)	1-	TY	6.1.1	3
Q.3	a) Explain: With two examples the greatness of wisdom of ancient	(10)	2	II	0.1.1	ر ا
	indian scholars in the field of mathematics and astronomy.	(1.0)	2	V	6.1.1	3
	b) Discuss: Advancement in the field of science and technology in	(10)	2	V	0.1.1	١
	ancient India.				(11	-
Q.4	a) Justify: Advancements in medicinal and healthcare practices in	(10)	2	VI	6.1.1	4
	ancient India.	(10)	2	VI	6.1.1	4
	b) Justify: "Yoga is the key for long life with good health" in context	(10)	-	1	0	
	of ancient as well as modern India.				(11	<u> </u>
Q.5	a) List: Names of various Indian classical dance forms and Describe:	(10)	3	I, V	6.1.1	5
	Any two of them with its significance.					
	b) List: Various traditional art forms of ancient Indian and Describe:	(10)	3	I, V	6.1.1	5
	any one of them.	(10)	-		(11	1 6
Q.6	a) Explain: Rich heritage of Indian Traditional Languages since	(10)	3	II	6.1.1	1
	ancient times and significance of any one language of India.	(4.0)		*7	611	1
	b) List: 03 Main epics / literature in Indian tradition. Discuss:	(10)	3	V	6.1.1	1
	Significance and teachings of any one epic / literature.	(10)	4	*7	611	1
Q .7	· ·	(10)	4	V	6.1.1	
	Dnyaneshwar Maharaj.	(10)	4	V	6.1.1	,
	b) Discuss: In brief, life, work and teachings of Bhagwan Mahaveer	(10)	4	V	0.1.1	
	Vardhaman.	<u></u>				1



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SARDAR PATEL COLLEGE OF ENGINEERING



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

End Semester Examinations June-July 2022 (DSE)

D. J. Y. J. (2021-22)

Program: S.Y. B. TECH

Course Code: PC-BTC-405

Course Name: HYDRAULIC ENGINEERING

Duration: 03 Hrs.

Maximum Points: 100

Semester: IV

13/7/22

Notes:

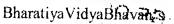
Attempt any five questions.

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
<u> </u>	(a) What do you understand by Dimensional homogeneity? Explain the term scale effects in model studies.	10	4	2	1.3.1
1	(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	4	4	2.1.2
	(a) Explain with neat sketches; (i) Working of siphon; and (ii) Power transmission through pipe and nozzle.	10	1	2	1.3.1
2	(b) What is HGL and TEL in pipe flow analysis? Draw HGL and TEL for three pipes connected in series carrying discharge Q from upper reservoir to lower reservoir. Diameter of pipes are D1, D2, D3 such that D1>D2 and D2 <d3, and="" difference="" f1,="" f2,="" f3="" factors="" friction="" h.<="" in="" is="" l1,="" l2,="" l3,="" lengths="" level="" lower="" reservoir="" respectively.="" td="" the="" upper=""><td>10</td><td>1</td><td>4</td><td>2.1.2</td></d3,>	10	1	4	2.1.2
	(a) Prove that the force exerted by a jet of water on a stationery semi- circular vane in the direction of the jet when the jet strikes at the center of the semi-circular vane is two times the force exerted by the jet on the stationery flat plate.		1	4	1.3.1
3	(b) A 45 m/sec velocity jet of water strikes without shock on a series of vanes moving at 15 m/sec. The jet is inclined at an angle of 21° to the direction of motion of vanes. The relative velocity of jet at outlet is 0.82 times the value at inlet and the flow is radial. Determine hydraulic efficiency.		1	5	2.3.1
4	(a) Explain with neat sketch working of a hydroelectric power plant. Also differentiate between impulse and reaction turbine.	10	2	2	2.1.2





SARDAR PATEL COLLEGE OF ENGINEERING



(Government, Aided Autonomous Institute) (Government Aided Autonomous Aut

End Semester Examinations June-July 2022 (DSE)

(2021-22))

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	(b) A Pelton wheel has a mean bucket speed of 12 m/sec and is supplied with water at a rate of 850 liters per second under head of 42 meter. If the bucket deflects the jet through an angle of 1600 find the	1.40	1000 T		
	the bucket deflects the jet through an angle of 160° , find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.96. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 82%.	10	2	4 :0	2.3.1
	(a) Explain:			- 4	
	(i) Cavitations in centrifugal pump; and (ii) Work done by an impellor of a centrifugal pump	10	2	2	2.1.2
5	(b) In an inward flow reaction turbine the diameter at inlet and outlet are 1.20m and 0.60 m. The hydraulic efficiency = 92%. Head = 45m. The velocity of flow at outlet = 2 m/sec. The discharge at outlet is radial. The vane angle at outlet is 150. Flow width is 0.10 m. at inlet and outlet. Determine (i) the guide blade angle (ii) vane angle at inlet and outlet.	10	2	4	3.1.6
4,4	(a) Write short notes on: (i) Minimum starting speed of a centrifugal pump; and (ii) Net Positive suction Head (NPSH).	10	2	2	2.1.2
6	(b)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	2	4	3.4.2
7	(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	3	4	2.3.1
•	(b) Derive dynamic equation for gradually varied flow in case of a wide rectangular channel.	10	3	4	2.3.1



SARDAR PATEL COLLEGE OF ENGINEERING



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

End Semester Examinations MAY 2022

(2021-22)

Program: S.Y. B. TECH J. Y. B. Tech (Gul) Duration: 03 Hrs.

Course Code: PC-BTC-405

Maximum Points: 100

Course Name: HYDRAULIC ENGINEERING

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
	undistorte	ed models and sca	le effects in model s		10	4	2	1.3.1
1	pipe 'D',	friction factor 'f	lepends upon diameter of and rate of flow through d using Buckingham's-π		4	4	2.1.2	
	in paralle	l, and (ii) working	g of siphon	pipes in series and pipes	10	1	2	1.3.1
2	100 mete the nozzl	r below the surfa e which will deli	ce of a reservoir. D	er long discharges water etermine the diameter of ower. Assume $f = 0.022$.		1	4	2.1.2
	pressure i	s mean by water l in a thin elastic p topped by sudden	ipe of circular secti	expression for the rise in on in which the flow of	10	1	4	1.3.1
3	meter lev Consideri	el. The details of	of piping system ar ajor losses in pipe	rom 80 meter level to 35 re as given in Table 1. s, determine; discharge,				2.2.3
				1 1 1 1 1 1 1 1 1 1	10	1	5	2.2.3
	Pipe	Length	Diameter	Friction Factor				
		Length (m)	Diameter (mm)	Friction Factor (f)				The state of the s
	1	(m) 900						
		(m)	(mm)	(f)				The state of the s



SARDAR PATEL COLLEGE OF ENGINEERING



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

End Semester Examinations MAY 2022

(2021-22)

	(a) 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	2	2	2.1.2
4	(b) A jet of water of diameter 50 mm. strikes a fixed plate in such a way that the angle between the plate and the jet is 30 degrees. If the force exerted in the direction of the jet is 1550 N, determine the rate of flow of water.	10	2	4	2.3.1
	(a) Explain: working of a Pelton type turbine with neat sketch and derive an expression for hydraulic efficiency.	10	2	2	
5	(b) A turbine is to operate under a head of 30 m and a speed of 300 rpm. The discharge is 15 m ³ /sec. Assuming efficiency of 0.85, calculate the power developed. What would be the specific speed, power, discharge, rotational speed at a head of 20 m?	10	2	4	3.1.6
6	(a)Write short notes on: (i) Priming of a centrifugal pump and (ii) Pumps in parallel and series.	10	2	2	2.1.2
	(b) The internal and external diameters of the impeller of a centrifugal pump are 300 mm and 600 mm respectively. The pump is running at 900 r.p.m. The vane angles at inlet and outlet are 20° and 30° respectively. The water enters the impellor radially and velocity of flow is constant. Determine the work done by the impellor per unit weight of water.	10	2	3	3.4.2
7	(a) What is most economical channel section? Discuss prismatic and non-prismatic channels and derive the conditions for most economical triangular channel section.	10	3	4	2.3.1
	(b) Derive the dynamic equation for gradually varied flow (GVF) in case of a wide rectangular channel.	10	3	4	2.3.1



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

Re-Examinations JULY 2022 (PC-BTC-405)

(2021-22)

Program: S.Y. B. TECH

J. Y. A. Tech Course Code: PC-BTC-405

Course Name: HYDRAULIC ENGINEERING

Maximum Points: 100

Semester: IV

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		ss hydraulic mod d models in dimen	ted and	10	4	2	1.3.1		
1	(b) Explai	n Buckingham's -	π theorem.			10	4	4	1.3.1
	(a)Explain	working of Sipho	n.			10	1	2	1.3.1
2			nd pipes in parallel.			10	1	4.	1.3.1
	(a) Explai	n briefly the pheno	omenon of water han	nmer flow in pipe lin	es	10	1	4	1.3.1
3	level. Det	ermine discharge	Table 1	n 55 meter level to	30 meter				2.2.3
3	Pipe	Length	Diameter	Friction Factor	į	10	1	5	
		(m)	(mm)	(f)	-	the second of th			
	1	300	200	0.019	-				
	2	250	100	0.021	1				
	(a)Explain	n Impulse moment	um principle with an	d an example.		10	2	2	2.1.2
4			y of a free jet strikin hery of a wheel can r	g normally on a seri- never exceeds 50%.	es of flat	10	2	4	2.3.1
	(a) Diffe example	rentiate between	Impulse turbine an	d reaction turbine.	Give an	10	2	2	1.3.1
5		in in brief perform	nance characteristics	curves of hydraulic t	urbines.	10	2	4	3.1.6
6	(a)Explain	_	ifugal pump. Highlig	tht the importance of	priming	10	2	2	2.1.2
U	(b) Discu	ss pumps in series,	pumps in parallel ar	nd multistage pumps.		10	2	3	3.4.2



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

Re-Examinations JULY 2022 (PC-BTC-405)

(2021-22)

77	(a) What do you mean by most economical channel section? Derive the conditions for most economical rectangular channel section.	10	3	4	2.3.1
/	(b) Differentiate between uniform and non-uniform flow. Also explain specific energy diagram.	10	3	4	2.3.1

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SARDAR PATEL COLLEGE OF ENGINEERING

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



END SEMSTER EXAMINATION JULY 2022

Program: Civil Engineering Course Code: PC-BTC406

Course Name: Transportation Engineering 40.44

Duration: 3 Hours Maximum Points: 100

Semester: IV

1577/22

Notes:

1. Question No 1 is compulsory.

2. Attempt any four questions from remaining five questions.

3. Draw figure or table wherever required.

Q.No.	Questions	Point s	СО	BL	PI
1	Attempt any four				†
1 (a)	Define gauge and discuss different types of gauges.	5	CO 4	1	
(b	Define Rail, Ballast and sleepers and draw cross-section of P-Way.	5	CO 4	1	
1 (c)	Define points and crossing with figure.	5	CO 5	1	
1 (d)	Define airport obstructions and enlist various obstructions. Draw figure for Inner Horizontal Surface	5	CO 2	1	
1 (e)	Explain any two runway patterns with neat sketch.	5	CO 3	2	
2 (a)	Design an exit taxiway which joins a runway and main parallel taxiway with following data: Total angle of turning is 42°, exit speed is 80 kmph, and Coefficient of friction is 0.12.	10	CO 3	4	
2 (b)	Explain in detail the various factors need to be considered while selecting site for airport	10	CO 2	1	
3 (a)	Briefly discuss runway and taxiway marking and lightening with help of figure.	10	CO 3	2	
3 (b)	If the basic runway length for an airport situated at an elevation of 360 m is 1900 meters, find the actual runway length required if the mean of average daily temperature and mean of maximum daily temperature obtained as 36°C and 42°C respectively.	10	CO 3	4	
	End to End Gradient (m) (%) 0 to 300 +1.00 300 to 600 -0.50				



SARDAR PATEL COLLEGE OF ENGINEERING



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

END SEMSTER EXAMINATION JULY 2022

	THE TOTAL STATE OF THE STATE OF				
	600 to 1200 +0.50	aportion?	21. 10.	A 11 A	H.
	1200 to 1500 +1.00	1			T
	1500 to 1800 -0.50				Ì
	1800 - 200				
	2000 : 240-				
	2000 to 2400 -0.10			1	
4 (a)	Define Creep and explain theories of creep. Also explain the conning of wheels tilting of rolls and in the				
()	conning of wheels, tilting of rails, adzing of sleepers.	10	CO	2	T
		10	4	12	1
	a 2° main curve in opposite direction of a meter gauge (MG)				1
4 (b)			00		1
	permissible cant deficiency is 5.1	10	CO	4	1
	permissible cant deficiency is 5.1 cm, what would be the speed on main line?		5		1
	· ·			1	1
5 (a)	Draw a neat sketch of right-hand turnout and explain all				
(4)		10	CO	2	
	Calculate the superelevation and the	10	5	2	
5 (b)	with a maximum sanctioned speed of 105 km/h. The speed for calculating the equilibrium				
y (u)	for calculating the equilibrium and 105 km/h. The speed	10	CO		
		10	5	4	
	the chief engineer is 70 km/h and the booked speed of goods trains is 45 km/h.				
	ECONID IS 43 KIIVII.				
(a)	Social and E.				
(-)	Social and Economic benefits of transportation system	5	CO	2	
(b)	Explain with next sketch discounts		1	-	
	Explain with neat sketch, different types of rail sections.	5	CO	2	
(c)	Define degree of curvature and derive expression for the		4	_	
-	same.	5	CO	4	
			5		
(d)	Explain step by step procedure of wind rose diagram type -I		CO	_	_



Sardar Patel College of Engineering

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



End Semester Examination, (May, 2022)

Program: S. Y. B. Tech. Civil Engineering Selection

Duration :3 Hours

30/5/22

Course code: BTC 406

Maximum Marks: 100

Name of the Course: Transportation Engineering

Semester:

IV

Instructions:

(i) Question Number 1 is compulsory

(ii) Solve any four questions from remaining six questions

(iii) Figures to the right indicate full marks and all questions carry equal marks

(iv) Assume any data if required, stating them clearly

(v) Use graph paper if required

Question No.	Question	Max. Mark s	Course Outcome Number	Modu le No.
Q.1.	Solve any four (5 marks each sub question)	20	01	01
A	Discuss Role of Transport in the society.		01	01
В	Explain with sketch coning of wheel and tilting of rail.		01	04
С	What is creep of rail? How will you measure it?		01	05
D	Explain airport classification system.		01	02
E	How will you decide the location of Exit Taxiway.		01	03
Q.2.		· · · · · · · · · · · · · · · · · · ·		
A	Draw a Neat Sketch of Aircraft and show all its component parts. Also, Discuss wing of the aircraft with respect to (i) lift to drag ratio, (ii) surface area, (iii) aspect ratio, (iv) camber shape of wing.	10	03	04
В	Enlist the advantages and disadvantages of Uniformity of gauge.	05	03	04
С	Derive the relationship between super elevation, speed, Gauge and radius of circular curve.	05	03	05
Q.3				
A	Discuss with neat sketch (i) Take off climb surface, (ii) Approach surface, (iii) Inner Horizontal surface	12	01	02

	Design an exit taxiway joining runway and parallel main taxiway. The	4	1	1
В	total angle of turn is 30° and turning speed 80 km/hr. draw a neat	08	01	0.5
	sketch showing all design elements	Vo	U1	0.
Q.4				
A	Discuss with sketch how you will decide the Basic Length of Runway.	08	01	02
	The length of runway under standard condition is 2100 m. the airport			-
	is to be provided at an elevation of 380 m above mean sea level. The			
	gradient need to be provided at the site under consideration is given			
В	Table 1. The monthly mean temperatures of the atmosphere at a	12	01	02
	particular site where airport has to be constructed are given in Table 2.			
	Apply the necessary correction as per ICAO and FAA and calculate			
	the corrected length of runway.			
Q.5				1
A	Discuss different types of engine used in aircraft	06	01	02
В	Explain with sketch how the movement of aircraft can control in space.	06	01	02
C	Enumerate the various factors you would like to keep in mind while	00	0.4	
C	selecting suitable site for the Airport.	08	01	02
2.6.				
A	What is gauge. Discuss different types of gauge.	05	02	04
В	Discuss with sketch different types of joints	05	02	04
	The average wind data collected at particular site is given Table 3.			
	Determine calm period, orientation of runway and wind coverage.			
C	Assume permissible cross wind component = 25 km/hr. plot wind rose	10	02	03
•	diagram considering	10	03	02
	(i) Direction and total duration			
	(ii) Direction, duration and intensity of wind			
.7.				
A	write short notes on different types of Gradient	05	01	04
В	Write short notes of sleeper density.	05	01	03
	Using the sleeper density of (n + 5) estimate the number of rail and			
C	sleepers required for construction of 1 km long (i) broad gauge (ii)	10	00	
C	meter gauge railway track. Also, calculate the number of fish plate	10	03	03
	and fish bolt required for construction.			

Q.4 (b) Table 1.

End to end runway length (m)	0 to 300	300 to 1200	1200 to 1800	1800 to 2400	2400 to 3500
Gradient (%)	+ 1.0	- 0.50	+ 0.50	- 0.60	+0.50

Q.4. (b) Table 2.

Month	Mean value of average daily temperature	Mean value of Maximum daily temperature	Month	Mean value of average daily temperature	Mean value of Maximum daily temperature
Jan	3.00	5.50	July	32.6	37.7
Feb	15.5	17.0	Aug	30.5	35.5
Mar	20.0	23.4	Sept	27.4	31.5
Apr	25.6	32.3	Oct	22.8	28.3
May	37.7	47.4	Nov	12.9	18.0
June	40.4	50.60	Dec	6.70	12.3

Q.6 (c) Table 3.

Wind direction	Duration of wind in percentage						
	6.4 to 25 km/hr	25 to 50 km/hr	50 to 75 km/hr				
S	4.5	1,3	0.1				
SSW	3.3	0.8	0				
SW	1.8	0.1	0				
WSW	2.7	0.3	0				
W	2	0.4	0				
WNW	5.3	0.1	0				
NW	6.3	3.2	0.1				
NNW	7.4	7.7	0.3				
N	4.6	2.2	0				
NNE	2.4	0.9	0				
NE	1.1	0.1	0				
ENE	3.6	0.4	0				
Е	1.8	0.3	0				
ESE	5.9	2.6	0.2				
SE	5.8	2.4	0.2				
SSE	6.8	4.9	0.3				



SARDAR PATEL COLLEGE OF ENGINEERING

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

S. Y. A. Tech Civil) Sum
RE-EXAMINATION JULY 2022

18/7/22

Program: S. Y. B. Tech. Civil

Course Code: PC - BTC 406

Course Name: Transportation Engineering

Duration: 3 Hours

Maximum Points: 100

Semester: IV

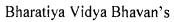
Notes:

(i) Question 1 is compulsory

(ii) Solve any four out of remaining six questions

(iii) Assume suitable data if required

Q.No.	Questions	Points	со	Module NO.
Q.1.		 		
(a)	Discuss the systematic approach for expansion of existing airport or construction of new airport	10	1	2
(b)	What are the assumption made while calculating the basic length of runway. Discuss step by step procedure for calculation of corrected length from basic length of runway.	10	1	2
Q.2.				
(a)	Derive the relationship between superelevation, speed, Gauge and radius of circular curve. What are its limiting values for different gauges.	10	2	3
(b)	A 5° curve diverges from 2° main curve in reverse direction in a layout of broad gauge yard. If the speed on branch line is restricted to 30 km/hr. determine the restricted speed on main line.	10	2	3
Q. 3.				
(a)	what is turnout. Explain with sketch left and right hand turnout	06	2	3
(b)	Derive the expression for curve lead and switch lead.	06	2	3
(c)	Calculate the elements required to set out 1 in 8 turnout, taking off from straight broad gauge track with its curve starting from toe of switch. Heel divergence = 11.4	08	2	3
Q. 4.	write short notes on,(each sub question carries 4 marks)	20	2	3
(a)	Outer signal,	1		
(a) (b)	Home Signal	1		
(c)	Ballast less track			
(d)	Terminal station			
(e)	Types of Marshalling yards.			1





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RE-EXAMINATION JULY 2022

Q.5.		1		
(a)	Discuss with neat sketch Runway and Taxiway Marking	10	1	2
(b)	Discuss the points you will consider while selecting the site for station.	10	2	3
Q.6.				
(a)	Discuss the theoretical nose of crossing and actual nose of crossing	06	2	3
(b)	Explain the relationship between number of crossing, permissible speed and angle of crossing.	06	2	3
(c)	Draw a neat sketch of double lined turn out showing important component part of point and crossing.	08	2	3
Q.7.				
(a)	Draw a layout plan of Airport and show all the details	06	1	2
(b)	Aircraft Parking Configuration	06	1	2
(c)	The length of runway under standard condition is 1500 m, the airport reference temperature is 25°c the airport is to be provided at elevation of 125 m above mean sea level. Calculate the corrected length of runway for following data.	08	1	2

End to end runway length (m)	0 to 300	300 to 900	900 to 1500	1500 to 1800	1800 to 2100
Gradient (%)	+ 1.0	- 0.20	+ 0.50	+ 1.0	-0.30



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 Examination

DSY July 2022

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Max. Marks: 100

Semester: IV

Class: S.Y. B. Tech

Name of the Course: Environmental Engineering I

Program: Civil

Course Code: BTC407

20/7/22

Instructions:

Q1 is compulsory. Attempt any four questions out of remaining five

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 fol	llowing Qu	estions				(20)	CO	BL	PI
(a)	A town of Sard supply scheme records are prosupply system in developing city Table 1. Year	chu in Laha is to be deve ovided in to is to be desi /.	aul has a popeloped for the able 1. Calcu	area for the y	ear 2040 . Toulation for	The past censur which water	er (05)	CO1 ,CO 4	4-5	3.4.2
	Population	11,000	15,000	17,500	22,000	4 0,000				
(b)	As a city engine for a growing c	city. Further	enlist the fac	tors affecting	g rate of dea	be considere mand.		CO1 ,	4-5	3.3.2
(c)	For the city of surface water seach source. Describe the efficiency of emanganese conthe levels.	source (Car Draw a flow function of ach unit wi	nal). Delibera wsheet for the feach unit in the respect to	te on the chase treatment of the flows relevant cha	racteristics of surface sheet. Com racteristic.	of water from water source ment on the The iron an	n e. e	CO1 - CO4	3-5	3.2.1
Q2	Answer the fol	lowing aue	etions		·····					
(a)	A bell mouth population obta a day with a de works are 0.30 be considered 1 less than 15cm/ iron bars of 20 discharge. Assu	canal intained in Q1 (epth of 2 m. km away. I 00 lpcd. Assorber and 30 mm dia an	ake is to be (a) drawing w. Calculate he Draw a neat s sume velocity cm/sec. (for a placed at 3	vater from a cead loss in in sketch. Consuly through screens consider to 5 cm c to 2 c	canal which take condu imption of eens and be ider it is ma o c). Design	truns for 8 hr it if treatmer the town is t all mouth to b ade of vertica on for average	s at o e	CO2 , CO3	3-4	5.3.1

0.000 70(2 - 0.00 -	,			
loss equation as $v=0.85C_HR^{0.63}$ S $^{0.54}$ (C _H = 130 dependent on pipe material, R				
Design would mix unit for the situate South for mountain of 2010 with all	(F)	GO1	2.5	122
	(5)	Į.	3-3	4.2.2
enecks. Ose appropriate value of μ .		, .		=
Lime and soda were used for softening in Sarchu for treatment of following	(5)		3-4	3.2.2
impurities CaSO ₄ = 120 mg/L; NaCl= 130 mg/L; MgCl ₂ = 80 mg/L. Compute		-		-
the quantities of chemicals required for Sarchu in year 2040. Assume soda ash		CO4	ĺ	1
and lime purity 80%. (Consider data in Q1(a))				
A	(20)			
		CO2	2.2	221
sedimentation tank for Sarchy considering 2000 nonvection and water demand	(10)	CO2	2-3	2.2.1
]	CO4		-
	(10)		3-4	3.2.1
for population of 2040 and water demand 100 lpcd. The mean G value is	(-0)	-	•	-
30Sec ⁻¹ and detention time is 40 min. There are three compartments with		CO4		
$G1=50 \text{sec}^{-1}$, $G2=25 \text{Sec}^{-1}$ and $G3=15 \text{sec}^{-1}$. Basins width is 15 m. Speed of				
				_
				-
				-
			•	
•		İ		
Answer any two of the following questions	(20)			
Explain filter troubles. Design rapid sand filter for (size and	(15)	CO1	3-5	5.3.2
underdrainage system) for the population for the year 2040 for Sarchu town		-		
				-
	(05)	1	2-4	5.4.1
		1		
		4		
ipeu.				
Answer the questions	(20)			
	(05)	CO3	2	2.3.1
			ļ	
	 			2.3.2
Explain the process of removal of hardness from water	(05)	CO3	2,3	4.3.2
Write metas on any ferror	(20)	CO2	2	2.3.3
		COZ		2.3.3
	 			
and the same of th				
· · · · · · · · · · · · · · · · · · ·		 	 	
				
	1 32/	 		
A	1			T
Answer the questions	L	<u> </u>	<u> </u>	1
	the quantities of chemicals required for Sarchu in year 2040. Assume soda ash and lime purity 80%. (Consider data in Q1(a)) Answer the following questions Derive Stoke's law for discrete particle. Design a circular coagulation aided sedimentation tank for Sarchu considering 2040 population and water demand 100 lpcd. A cross flow horizontal paddle wheel flocculator is designed for Sarchu city for population of 2040 and water demand 100 lpcd. The mean G value is 30Sec¹ and detention time is 40 min. There are three compartments with G1=50sec¹, G2=25Sec¹ and G3 = 15sec¹. Basins width is 15 m. Speed of blades relative to water is 0.75 times peripheral speed of the blade. Cd is 1.5. Use appropriate value of µ. Find (1) Dimensions of the basin (2) Number of blades and geometry of basin (3) Power requirements (4) Rotational speed of shaft Answer any two of the following questions Explain filter troubles. Design rapid sand filter for (size and underdrainage system) for the population for the year 2040 for Sarchu town having water demand 100 lpcd. Explain various disinfectants. Find chlorine consumed in kg/day and chlorine dosage in mg/L for the city of Sarchu in 2040 if the residual chlorine is 0.2 mg/L and a chlorine demand is 0.6 mg/L and average water demand of 100 lpcd. Answer the questions Deliberate on quality of ground water and surface water and what techniques are used to purify these water types Explain any 3 techniques to treat taste, color and odor in detail Explain the process of removal of hardness from water Write notes on any four Electro-dialysis Reverse osmosis Water distribution systems Iron and Manganese in water and their removal Ion Exchange	is hydraulic mean depth and for circular section it is d/4; and S is slope of energy line or HI/L) Design rapid mix unit for the city of Sarchu for population of 2040 with all checks. Use appropriate value of μ. Lime and soda were used for softening in Sarchu for treatment of following impurities CaSO4 = 120 mg/L; NaCl= 130 mg/L; MgCl₂= 80 mg/L. Compute the quantities of chemicals required for Sarchu in year 2040. Assume soda ash and lime purity 80%. (Consider data in Q1(a)) Answer the following questions Derive Stoke's law for discrete particle. Design a circular coagulation aided sedimentation tank for Sarchu considering 2040 population and water demand 100 lpcd. A cross flow horizontal paddle wheel flocculator is designed for Sarchu city for population of 2040 and water demand 100 lpcd. The mean G value is 30Sec¹ and detention time is 40 min. There are three compartments with G1=50sec¹ and G3 = 15sec¹ Basins width is 15 m. Speed of blades relative to water is 0.75 times peripheral speed of the blade. Cd is 1.5. Use appropriate value of μ. Find (1) Dimensions of the basin (2) Number of blades and geometry of basin (3) Power requirements (4) Rotational speed of shaft Answer any two of the following questions Explain filter troubles. Design rapid sand filter for (size and underdrainage system) for the population for the year 2040 for Sarchu town having water demand 100 lpcd. Explain various disinfectants. Find chlorine consumed in kg/day and chlorine dosage in mg/L for the city of Sarchu in 2040 if the residual chlorine is 0.2 mg/L and a chlorine demand is 0.6 mg/L and average water demand of 100 lpcd. Answer the questions Deliberate on quality of ground water and surface water and what techniques are used to purify these water types Explain any 3 techniques to treat taste, color and odor in detail Explain the process of removal of hardness from water Write notes on any four Deliberate on any four Electro-dialysis Reverse osmosis (05) Water distribution systems In and Manganese in wate	is hydraulic mean depth and for circular section it is d/4; and S is slope of energy line or H/IL) Design rapid mix unit for the city of Sarchu for population of 2040 with all checks. Use appropriate value of \(\mu\$. Lime and soda were used for softening in Sarchu for treatment of following impurities \(\text{CaSO}_4 = 120 \) mg/L; \(\text{NaCl=} 130 \) mg/L; \(\text{MgCl}_2 = 80 \) mg/L. \(Compute the quantities of chemicals required for Sarchu in year 2040. Assume soda ash and lime purity 80%. (Consider data in Q1(a)) Answer the following questions Derive Stoke's law for discrete particle. Design a circular coagulation aided sedimentation tank for Sarchu considering 2040 population and water demand 100 lpcd. A cross flow horizontal paddle wheel flocculator is designed for Sarchu city for population of 2040 and water demand 100 lpcd. The mean G value is 30Sec \(^1\) and detention time is 40 min. There are three compartments with G1=50sec \(^1\), G2=25Sec \(^1\) and G3 = 15sec \(^1\). Basins width is 15 m. Speed of blades relative to water is 0.75 times peripheral speed of the blade. Cd is 1.5. Use appropriate value of \(\mu\$. In the comparison of the basin (2) Number of blades and geometry of basin (3) Power requirements (4) Rotational speed of shaft Answer any two of the following questions Explain filter troubles. Design rapid sand filter for (size and underdrainage system) for the population for the year 2040 for Sarchu town having water demand 100 lpcd. Explain various disinfectants. Find chlorine consumed in kg/day and chlorine dosage in mg/L for the city of Sarchu in 2040 if the residual chlorine is 0.2 mg/L and a chlorine demand is 0.6 mg/L and average water demand of 100 pcd. Answer the questions Deliberate on quality of ground water and surface water and what techniques are used to purify these water types Explain any 3 techniques to treat taste, color and odor in detail Deliberation of the purify these water types Explain any 3 techniques to treat taste, color and odor in de	is hydraulic mean depth and for circular section it is d/4; and S is slope of energy line or HJ/L) Design rapid mix unit for the city of Sarchu for population of 2040 with all checks. Use appropriate value of μ. Lime and soda were used for softening in Sarchu for treatment of following impurities CaSO ₄ = 120 mg/L, NaCl= 130 mg/L, MgCl ₂ = 80 mg/L. Compute the quantities of chemicals required for Sarchu in year 2040. Assume soda ash and lime purity 80%. (Consider data in Q1(a)) Answer the following questions Derive Stoke's law for discrete particle. Design a circular coagulation aided sedimentation tank for Sarchu considering 2040 population and water demand 100 lpcd. A cross flow horizontal paddle wheel flocculator is designed for Sarchu city of population of 2040 and water demand 100 lpcd. The mean G value is 30Sec-1 and detention time is 40 min. There are three compartments with G1=50sec-1, G2= 25sec-1 and G3 = 15sec-1. Basins width is 15 m. Speed of blades relative to water is 0.75 times peripheral speed of the blade. Cd is 1.5. Use appropriate value of μ. Find (1) Dimensions of the basin (2) Number of blades and geometry of basin (3) Power requirements (4) Rotational speed of shaft Answer any two of the following questions Explain filter troubles. Design rapid sand filter for (size and underdrainage system) for the population for the year 2040 for Sarchu town having water demand 100 lpcd. Answer the questions Explain various disinfectants. Find chlorine consumed in kg/day and chlorine dosage in mg/L for the city of Sarchu in 2040 if the residual chlorine is 0.2 mg/L and a chlorine demand is 0.6 mg/L and average water demand of 100 lpcd. Answer the questions Deliberate on quality of ground water and surface water and what techniques are used to purify these water types Explain any 3 techniques to treat taste, color and odor in detail (10) CO3 2 Explain the process of removal of hardness from water (20) CO2 2 Explain the process of removal of hardness from water (20) CO3 2. Write notes

	is universal disinfect						1
	ii. Color and odor can be removed by	and					
	iii. Typical size of colloidal particles is	s to					
	iv.Filteration removes	and			ł		
	v. The valve is used in		n				
	viandare the coagulant						
1	vii and						
	water treatment	are two methods to	remove saits in				
		11 11 11					
	riii and are sl	nallow sedimentation dev	ices				
	ix is a naturally occur						
	x.pH of alkaline water is	·					
(B)	Explain the following (and too)			ļ			
(B)	Explain the following (any two)			10	CO ₂	5	5.2
					,CO		
(i)	Jar test			(2*5)	3	ļ	
(ii)	MPN Test					ļ	
	Super and de chlorination						
	la Sheet				L	<u> </u>	
		Al=27	WID OF		· ·····		
P =	$P_o \left[1 + \frac{r}{100} \right]^n$	Ca=20	WLR=Q/B				
] -n	^o [100]	C=12	WLR= Q/2лR				
	- n(n 1) -	O=16	DT= V/Q	3/1/ 2			
$P_n = I$	$P_o + nx + \frac{n(n+1)}{2}y$	S=32	SOR= 12-20 n V= 0.849 C R		1		
1	2	Cl=35.5	1		,		
	$\left \frac{P_s - P}{P} \right - \left \frac{P_s - P_o}{P_o} \right = -kP_s * t$	H=1	SOR= 24-30m				
log _e	$\frac{3}{P} \left - \left \frac{3}{P} \right = -kP_s * t$	Na=23	$WLR = 200 \text{m}^3 / DT = 20 \text{ to } 50 \text{ m}^3 / DT = 20 \text{ m}^3 / DT$				
-		Fe= 55.5					
$P_n = 0$	$(P_o + n\overline{x})$	Mg=24	Minimum distal baffle walls 0.4			ccessi	ve
r = t	r ₁ * r ₂ * r ₃ * * r _n	Si=14				and La	
$ \cdot - \mathbf{v} $	r_1 r_2 r_3 r_n	H:D= 2:1	Clear opening wall =1.5 (d)	at end o	i baille	and ba	ısın
		11.15 2.1	wan -1.5 (a)				
SA=vo	olume/SOR	$G = 300 - 700s^{-1}$	$\mathbf{p}^{-1}\mathbf{c}$	3			
		0.5 min to 1 min	$P = \frac{1}{2} C_d \rho. A_p. v_r$				
			$C_d = 1.8 fc$		•	S	
				= 998k	U ,		
Ratio	of length to diameter of let 1 c co		v_r :	$= (1 - 1)^{-1}$	$0.25)v_p$		
Katio	of length to diameter of lateral ≤ 60	$\mathbf{v}_{s} = \frac{1}{18} \frac{g}{v} (S_{s} - 1) $ $* d^{2}$					
Spacin	or of laterals— anguing of arising 150	$18 v^{(0s)}$	Q/A; Q/ perime	eter; Q/b	; V/Q		
to 300	g of laterals= spacing of orifices= 150	$*d^2$	$V = D^2 (0.011D)$	+0.785I	- I)		
10 300	mm	*** 1					
Dia of	perforations 5 to 12 mm	Value of	Rate = $3000-60$	000litre/	hr/m2		
	ng 80 mm for 5 and 200 mm for	$v=1.002X10^{-6} \text{ m}^2/\text{sec}$. •				
12mm)	v_d	$G^2 = P/I$	$\mu V =$	$C_DA\rho$	$v^3/2\mu$	V
	rea of perforations < 0.5	/8β\					
Total c	s area of laterals	$= \sqrt{\left(\frac{\partial p}{f'}\right)(S_s - 1)dg}$					
		V					
Total a	rea of perforation = 0.002 to 0.003	f' = 0.025 - 0.03					
Entire	filter area	g=9.8m/s ²					
	f manifold= 1.5 to 2 times laterals						
	1000				<u> </u>		

Rate of filtration = 300 to 500l/hr/m ² Rate of filtration = 3000-6000l/hr/m ² Max. demand= 1.8 Q	-	
$G = \sqrt{\frac{P}{\mu * V}}$ $\mu = 1.0087*10^{-3} \text{Ns/m}^2$	$P = F_D * \nu_r$	$G * t = \frac{V}{Q} * \sqrt{\frac{P}{\mu V}} = \frac{\sqrt{\frac{PV}{\mu}}}{Q}$

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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 Examination May 2022

Duration: 3 Hrs

Semester: IV

Program: Civil

1/6/22

Max. Marks: 100

Class: S.Y. B. Tech (Civil) Leur TV.

Name of the Course: Environmental Engineering I

Course Code: BTC407

Instructions:

Q1 is compulsory. Attempt any four questions out of remaining five

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

							(20)	CO	BL	PI
Q1 (a)	Answer the fold A town of Khirks supply scheme records are prosupply system developing city Table 1.	su in Uttarak is to be deve ovided in ta is to be desi	chand has a poly loped for the	late the nor	mlation for	which water ods for newly	(05)	CO1 ,CO 4	4-5	3.4.2
	1	16 000	20.500	25,000	31,000	40,000	(05)	CO1	4-5	3.3.2
(b)	As a city engir	oor of Khirs	u city which list the factor	water demans s affecting ra	ds are to be te of deman	considered for id.	(05)	CO2		
(c)	population ob hrs a day with works are 0.3 be considered less than 15ci iron bars of 2 discharge. As	tained in Q a depth of 2 5 km away. 120 lpcd. A n/sec and 30 20 mm dia a sume min w as v=0.850 mean depth	I (a) drawing m. Calculate Draw a neat assume velocing cm/sec. (found placed at vater level in the policy of the p	head loss in sketch. Consity through so r screens con 3 to 5 cm c canal to be 0	intake cond sumption of creens and b sider it is m to c). Desi .4 m below	u considering ch runs for 10 uit if treatment the town is to ell mouth to be ade of vertical gn for average FSL. Use headipe material, Fd S is slope of		CO2 CO3	3-4	5.3.1
Q2	Answer the	following q	uestions				er (10)	CO1	3-5	3.2.
(a)	For the city surface water	of Khirsu as er source (C	mentioned is mentioned in the case of the	e rate on the C e treatment o	f surface wa	ources of water from ater source. It is ggest additions	is	CO4		

	units. Describe the function of each unit in the flowsheet. Comment on the				
1	and contact the reconstruction of the relevant characteristic.	(5)	CO1	3-5	4.2.2
)	Design rapid mix unit for the city of Khirsu for population of 2040 with all		,co		
	checks	L	2		
	Lime and soda were used for softening in Khirsu for treatment of following	(5)	CO3	3-4	3.2.2
)			-		
	an of montative of chemicals icualication and	1	CO4		
İ	2040. Assume soda ash and lime purity 90%. (Consider data in Q1(a))				
	2040. Assume soda asii and thirt	(20)	1		ĺ
23	Answer the following uestions	(20)	CO2	2-3	2.2.1
a)	- 1: de l'anne Ideal Settling Tank Design ideal settling tank loi tile	(10)	COZ	4-5	2.2.1
a)	population for the year 2040 for Khirsu town having average water demand		CO4		
		(10)	CO2	2 1	321
b)		(10)	_		1
	- COMM The mann of value is subject and determine the state of		CO4		
	to the second of		11).		
	15sec ⁻¹ . Basins width is 15 m. Speed of blades relative to water is 0.75 times				
	peripheral speed of the blade. Cd is 1.5				
	Find		ļ		1
	(1) Dimensions of the basin(2) Number of blades and geometry of basin				
	(3) Power requirements				
	(4) Rotational speed of shaft		 	 	1
		(20)	1		-
Q4	Answer any two of the following questions Answer any two of the following questions Design rapid sand	(20)	CO1	3-5	5.3.2
(a)		(13)	-		
()	filter for (size and underdrainage system) for the population to		CO4	1	
	and a control of the same having water demand 100 lbcu.	(05)	CO3	2-4	5.4.1
(b)	Explain the characteristic of a good disinfectant. Find chlorine consumed in	1	,co		
	kg/day and chlorine dosage in mg/L for the city of Khirsu in 2040 if the residual chlorine is 0.2 mg/L and a chlorine demand is 0.6 mg/L and average water	1	4		
	chlorine is 0.2 mg/L and a chlorine demand is 0.5 mg/L and a chlorine	1			
	demand of 100 lpcd.			-	-
-	the uestions	(20)		1	100
Q 5	Deliberate on quality of ground water and surface water and what techniques	(05)	CO3	2	2.3.1
(a)	1	_	603	12	2.3.
(1-)	a . 1 ' to treat toste color and odor in detail	(10)			4.3.
(b)	Commence of hardness from water	(05)	CO3	2,5	4.5.
(c)	jacob service and the service	(20)	CO2	2	2.3.
Q6	Write notes on any four	(20)	1002	-	1
(i)		(05)	-		
(ii)		(05)	1		
(iii	Disinfectants	(05)	-		1
(iv	tage of their removal	(05)	+	1	
(v)		(03)			
1					
-	7 Answer the questions	(10)	CO	1 1	1.2
Q	Fill in the blanks	1110			

	ii and are two methods to remove salts in				
	water treatment ii and is used to remove salinity in water. iv and are shallow sedimentation devices v is a naturally occurring ion exchange. vi.pH of alkaline water is vii.Aeration of water removes and are methods for population forecasting viii and are methods for population forecasting techniques are used for fluoride removal x and type of water distribution systems are typically used in Indian cities				
(B)	State true or false with reasons (Give reasons for both true and for false statements)	10 (2*5)	,CO ,CO 3	5	5.2.1
(i) _	Aeration is used to remove hardness		1	1	1
(ii)	The scraping of 30 cm of sand is the method used to clean slow sand filter	1			
(11)					
(iii) (iv)	Geometric increase method is used for developed cities Two pipe system is the best plumbing method for planned cities				

Formula Sheet $P_{n} = P_{o} \left[1 + \frac{r}{100} \right]^{n}$ $P_{n} = P_{o} + n\overline{x} + \frac{n(n+1)}{2} \overline{y}$ $\log_{e} \left[\frac{P_{s} - P}{P} \right] - \left[\frac{P_{s} - P_{o}}{P_{o}} \right] = -kP_{s} * t$ $P_{n} = (P_{o} + n\overline{x})$ $r = \sqrt{r_{1} * r_{2} * r_{3} * \dots * r_{n}}$ $SA = \text{volume/SOR}$	Al=27 Ca=20 C=12 O=16 S=32 Cl=35.5 H=1 Na=23 Fe= 55.5 Mg=24 Si=14 H:D= 2:1 G=300-700s ⁻¹ 0.5 min to 1 min	WLR=Q/B WLR= Q/2 π R DT= V/Q SOR= 12-20 m³/d/m² V= 0.849 C R $^{0.63}$ S $^{0.54}$ SOR= 24-30m³/d/m² WLR= 200m³/m²/d DT= 20 to 50 min Minimum distance between successive baffle walls 0.45 m(d) Clear opening at end of baffle and basin wall =1.5 (d) $P = \frac{1}{2} C_d \rho. A_p. v_r^3$ $C_d = 1.8 \text{ for flat paddles}$ $\rho = 998kg/m^3$
Ratio of length to diameter of lateral ≤ 60 Spacing of laterals= spacing of orifices= 150 to 300 mm	$*d^2$ Value of	$v_r = (1 - 0.25)v_p$ Q/A; Q/ perimeter; Q/b; V/Q V= D ² (0.011D+0.785H) Rate = 3000-6000litre/hr/m2
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	$v=1.002 \times 10^{-6} \text{ m}^{2/\text{sec}}$ v_{d} $= \sqrt{\left(\frac{8\beta}{f'}\right)(S_{s}-1)dg}$	$G^2 = P/\mu V = C_D A \rho v^3 / 2\mu V$

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/m² Rate of filtration = 3000-6000l/hr/m²	f' = 0.025 - 0.03 g=9.8m/s ²	
Max. demand= 1.8 Q $G = \sqrt{\frac{P}{\mu^* V}}$ $\mu = 1.0087*10^{-3} \text{Ns/m}^2$	$P = F_D * v_r$	$G * t = \frac{V}{Q} * \sqrt{\frac{P}{\mu V}} = \frac{\sqrt{PV/\mu}}{Q}$

ALL THE BEST



Bharatiya Vidya Bhavan's SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai) Munshi Nagar Andheri (W) Mumbai 400058



Reexam 2022; July 2022

Max. Marks: 100 Class: S.Y B. Tech S.Y. A. Fece Civil) Sun Duration: 3 hrs

Semester: IV

Name of the Course: Environmental Engineering I

Program: Civil

Course Code: BTC407

2017/2

Instructions:

- Attempt 5 questions out of 7.
- Draw neat sketches/diagrams wherever required and wherever design is asked.
- 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**
- All the best

							Marks	CO	BL	PI
Q1	Answer the fe	ollowing qu	estions:				(20)	1-4	4-6	4.3.1
(a)	(a) A town of Hrishikesh in Uttarakhand has a population of 1,00,000 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 developed city. Table 1.				(10)					
	Year	1970	1980	1990	2000	2010				
	Population	36,000	40,500	55,000	80,000	1,00,000				
(b)	Hrishikesh has many small scale industries around it. The king "Hrinyakashyap" orders to find physical, chemical and biological parameters of water of Ganga to you. As an environmental engineer which parameters should be considered? Explain in detail parameters to be considered while deciding the quality of water in Ganges.					rical ngineer rameters	(10)			
Q2	Answer the following questions:					(20)	1-4	2, 6	5.1.2	
(a)						e s units in cility.	(20)			
Q3	Answer the following questions:						(20)	1-4	5,	4.2.2
(a)	Ministry of water resources of India has come up with demarcation of a particular Hrishikesh region having population of 100000 and water demand 90lpcd. Design a bell mouth canal intake for each Hrishikesh				and water	(15)				

area (depending onyour data) drawing water from a canal which runs only for 8 hrs a day with a depth of 2.5 m. Also calculate head loss in intake conduit if treatment works are 0.2km away. Draw a neat sketch. Assume velocity through screens and bell mouth as 20 cm/sec and 35 cm/sec (for screens considerit is made of vertical iron bars of 15 mm dia and placed at 3 to 5 cm c to c). Design for average discharge. Assume min water level in canal to be 0.4 m below FSL. Use head loss equation		
as • v=0.85 C _H R ^{0.63} S ^{0.54} (C _H = 130 dependent on pipe material, R is hydraulic mean depthand for circular section it is d/4; and S is slope of energy line or Hl/L)		

(b)	Articulate on factors to be considered while selecting an area for intake	(05)			
. /	and enlist various types of intakes				
Q4	Answer the questions	(20)	2-4	4,5, 6	5.1.3
(a)	Explain and Analyze the need of Jar Test	(05)			
(b)	Design a mechanical rapid mix unit for the area of Hrishikesh for 100000 population and 90 lpcd demand. Take value of μ as 1.0089E-03. Computepower requirements and give checks.	(10)			
(c)	Design a plain sedimentation tank for the same population and demand of Hrishikesh	(05)			
Q5	Answer the following questions:	(20)	3-4	5,6	6.1.2
(a)	Articulate on the need of flocculation. Design gravity type of flocculator for same population and demand of Hrishikesh. Assume any other data which is required. Enough space is available	(20)			
Q6	Answer the following questions:	(20)	1-4	5,6	6.3.2
(a)	Design rapid sand filter for the design flow of Hrishikesh(with under drains andwash water troughs)	(20)			
Q 7	Answer the following questions	(20)	1-4	4,5,	5.3.2
(a)	Develop a plan for disinfection of rural water well. Rationalize your plan.	(05)			
(b)	Illustrate distribution system design with figures, According to you which one is the best for Hrishikesh and why?	(05)			
(c)	Compare techniques to defluoridation. According to you, which is the best technique and why?	(05)			
(d)	Explain filter troubles	(05)			

		MILD OOD
Γ ¬ ⁿ	Al=27	WLR=Q/B
$P_n = P_o \left[1 + \frac{r}{100} \right]^n$	Ca=40	WLR= Q/2лR
100	C=12	DT= V/Q
- $n(n+1)-$	O=16	$SOR = 12-20 \text{ m}^3/\text{d/m}^2$
$P_n = P_o + nx + \frac{n(n+1)}{2}y$	S=32	$V = 0.849 \text{ C R}^{0.63} \text{ S}^{0.54}$
2	Cl=35.5	$SOR = 24-30 \text{m}^3/\text{d/m}^2$
$\log_e \left[\frac{P_s - P}{P} \right] - \left[\frac{P_s - P_o}{P_o} \right] = -kP_s * t$	H=1	$WLR = 200 \text{m}^3/\text{m}^2/\text{d}$
$\left \log_{e}\left \frac{\frac{s}{s}-1}{R}\right -\left \frac{\frac{s}{s}-\delta}{R}\right =-kP_{s}^{*}t$	Na=23	DT= 20 to 50 min
$\begin{bmatrix} P \end{bmatrix} \begin{bmatrix} P_o \end{bmatrix}$	Fe= 55.5	Minimum distance between successive
$P_n = (P_o + n\overline{x})$	Mg=24	baffle walls 0.45 m(d)
	Si=14	Clear opening at end of baffle and basin
$r = \sqrt[4]{r_1 * r_2 * r_3 * \dots * r_n}$	H:D= 2:1	wall =1.5 (d)
SA=volume/SOR	$G = 300-700s^{-1}$	$P = \frac{1}{2} C_d \rho. A_p. v_r^3$
SA=volume/SOV	0.5 min to 1 min	
	0.5 11111 00 1 11111	$C_d = 1.8$ for flat paddles
		$\rho = 998kg/m^3$
		$v_r = (1 - 0.25)v_p$
Ratio of length to diameter of lateral ≤ 60	1 9 (5 1)	
The contract of the contract o	$V_s = \frac{1}{18} \frac{g}{v} (S_s - 1)$	Q/A; Q/ perimeter; Q/b; V/Q
Spacing of laterals= spacing of orifices= 150	$*d^2$	$V = D^2 (0.011D + 0.785H)$
to 300 mm		
to soo min	Value of	Rate = 3000-6000litre/hr/m2
Dia of perforations 5 to 12 mm	$v=1.002 \times 10^{-6} \text{ m}^2/\text{sec}$	
(spacing 80 mm for 5 and 200 mm for	v_d	$G^2 = P/\mu V = C_D A \rho v^3 / 2\mu V$
12mm)	[[8B] (C 1)da	
Total area of perforations < 0.5	$ = \sqrt{\left(\frac{8\beta}{f'}\right)(S_s - 1)dg} $	
Total c/s area of laterals	f' = 0.025 - 0.03	
0.000 (0.002	1	
Total area of perforation = 0.002 to 0.003	$g=9.8 \text{m/s}^2$	
Entire filter area		
Area of manifold= 1.5 to 2 times laterals		
Rate of filtration = $300 \text{ to } 500 \text{l/hr/m}^2$		
Rate of filtration = $3000-60001/hr/m^2$		
Max. demand= 1.8 Q		
P	$P = F_D * v_r$	$G * t = \frac{V}{Q} * \sqrt{\frac{P}{\mu V}} = \frac{\sqrt{PV/\mu}}{Q}$
$G = \sqrt{\frac{P}{\mu * V}}$		$G * t = \frac{1}{C} * \frac{1}{uV} = \frac{1}{C}$
$\bigvee \mu^* V$		4 Mm.
μ =1.0087*10 ⁻³ Ns/m ²		