



Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

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



END SEM Examinations June 2023

Program: Civil Engineering

Duration: 3hr

Course Code: PC-BTC601

Maximum Points: 100

Course Name: Construction Engineering and Management

Semester: VI

Instructions: T.Y. BTech (Sem VI)

1. Attempt any five questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI																											
1	a	What is Bar chart? Discuss the advantages and disadvantages of Bar chart.	8	CO1 CO3	BL3	1.4.1																											
	b	Highlight the importance of BIM in Construction Management.	5	CO1	BL3	1.3.1																											
	c	Explain in brief stock out and overstocking cost. Derive an expression for the EOQ? Determine the EOQ from the following data: Annual demand- 17,500 units; Ordering cost= Rs.100, Cost per item = Rs. 17 (Assume suitable holding cost)	7	CO2	BL1	1.4.1																											
2	a	Enlists different types of Organizations and discuss in details the working of functional organization.	7	CO1	BL2	1.4.1																											
	b	Draw AOA and AON diagram for the activities given below in a Table. Apply Fulkerson's rule for numbering the events. Perform CPM calculations and Find the critical path.	8	CO2	BL5	2.3.1																											
		<table><tr><th>Activity</th><th>Immediate Predecessor(s)</th><th>Durations in (Weeks)</th></tr><tr><td>A</td><td>-</td><td>3</td></tr><tr><td>B</td><td>-</td><td>6</td></tr><tr><td>C</td><td>-</td><td>5</td></tr><tr><td>D</td><td>A</td><td>7</td></tr><tr><td>E</td><td>B</td><td>3</td></tr><tr><td>F</td><td>B,D</td><td>6</td></tr><tr><td>G</td><td>E</td><td>4</td></tr><tr><td>H</td><td>C</td><td>9</td></tr></table>	Activity	Immediate Predecessor(s)	Durations in (Weeks)	A	-	3	B	-	6	C	-	5	D	A	7	E	B	3	F	B,D	6	G	E	4	H	C	9				
Activity	Immediate Predecessor(s)	Durations in (Weeks)																															
A	-	3																															
B	-	6																															
C	-	5																															
D	A	7																															
E	B	3																															
F	B,D	6																															
G	E	4																															
H	C	9																															
	c	Highlight the importance of cash flow in a construction project.	5	CO2	BL2	1.4.1																											

3	a	What are the common causes of cost overruns in construction project?	4	CO2	BL2	1.4.1																																																													
	b	What do you mean by effective planning?	4	CO1	BL2	1.3.1																																																													
	c	Time estimates in days for the activities of a PERT network are given below.	12	CO2	BL4	2.3.1																																																													
		<table><tr><th rowspan="2">Predecessor</th><th rowspan="2">Successor</th><th colspan="3">Three Time Estimates</th></tr><tr><th>Optimistic</th><th>Likely</th><th>Pessimistic</th></tr><tr><th></th><th></th><th>t<sub>0</sub></th><th>t<sub>L</sub></th><th>t<sub>p</sub></th></tr><tr><td>10</td><td>20</td><td>5</td><td>12</td><td>17</td></tr><tr><td>10</td><td>30</td><td>9</td><td>11</td><td>12</td></tr><tr><td>10</td><td>50</td><td>8</td><td>10</td><td>13</td></tr><tr><td>20</td><td>40</td><td>9</td><td>11</td><td>13</td></tr><tr><td>20</td><td>50</td><td>5</td><td>8</td><td>9</td></tr><tr><td>30</td><td>60</td><td>14</td><td>18</td><td>22</td></tr><tr><td>40</td><td>80</td><td>14</td><td>17</td><td>21</td></tr><tr><td>50</td><td>70</td><td>21</td><td>25</td><td>30</td></tr><tr><td>60</td><td>70</td><td>8</td><td>13</td><td>17</td></tr><tr><td>70</td><td>80</td><td>6</td><td>9</td><td>12</td></tr></table>	Predecessor	Successor	Three Time Estimates			Optimistic	Likely	Pessimistic			t <sub>0</sub>	t <sub>L</sub>	t <sub>p</sub>	10	20	5	12	17	10	30	9	11	12	10	50	8	10	13	20	40	9	11	13	20	50	5	8	9	30	60	14	18	22	40	80	14	17	21	50	70	21	25	30	60	70	8	13	17	70	80	6	9	12		
Predecessor	Successor	Three Time Estimates																																																																	
		Optimistic	Likely	Pessimistic																																																															
		t <sub>0</sub>	t <sub>L</sub>	t <sub>p</sub>																																																															
10	20	5	12	17																																																															
10	30	9	11	12																																																															
10	50	8	10	13																																																															
20	40	9	11	13																																																															
20	50	5	8	9																																																															
30	60	14	18	22																																																															
40	80	14	17	21																																																															
50	70	21	25	30																																																															
60	70	8	13	17																																																															
70	80	6	9	12																																																															
		<p>i) Draw the project network and identify critical path.</p> <p>ii) Determine the expected project length, standard deviation and variance of project length.</p> <p>iii) What is the probability that the project will be completed in (i) 52 days, 30 days and (iii) 55 days?</p> <p>iv) Calculate the time required for completing the project with (i) 45% probability (ii) 95% probability and (iii) 80% probability.</p>																																																																	

	a	A construction project comprises seven activities. The duration in days of each activity is also shown below the arrow and their daily resource requirements are mentioned in the brackets. Determine the resource profile for this project if the activities are to start their EST and LST.	6	CO3	BL2	2.3.1
--	---	---	---	-----	-----	-------

4	b	What is earn value Management? How it can be considered as tool for monitoring and controlling of a construction project.	7	CO2	BL2	2.1.1
	c	Draw a Job layout for the construction of Metro station.	7	CO1	BL2	2.1.2

5	a	Explain the functions of Project management in detail.	6	CO4	BL2	1.3.1																																																																			
	b	Design check list for any construction activity. How it work as powerful tool for controlling the quality of project?	7	CO1	BL3	2.1.1																																																																			
	c	Explain the salient features of minimum wages act, 1948.	7	CO1	BL1	2.1.1																																																																			
6	a	Distinguish between Quality Control and Quality assurance.	4	CO4	BL2	2.1.2																																																																			
	b	Explain in detail equipment planning.	4	CO2	BL1	2.1.2																																																																			
	b	A project consists of 5 activities as shown below	12	CO3	BL4	2.3.1																																																																			
		Determine optimum project completion time assuming indirect cost as ₹ 375/- per week. Draw time scaled diagram for each stage of crashing																																																																							
		<table><tr><th>Activity</th><th>Time in weeks (NT)</th><th>Crash Time (CT)</th><th>Normal Cost ₹</th><th>Crash Cost ₹</th></tr><tr><td>1-2</td><td>4</td><td>3</td><td>700</td><td>900</td></tr><tr><td>1-3</td><td>3</td><td>1</td><td>300</td><td>500</td></tr><tr><td>2-3</td><td>8</td><td>6</td><td>850</td><td>1120</td></tr><tr><td>2-4</td><td>4</td><td>2</td><td>550</td><td>1200</td></tr><tr><td>3-4</td><td>5</td><td>4</td><td>500</td><td>700</td></tr><tr><td>4-5</td><td>5</td><td>3</td><td>450</td><td>800</td></tr></table>	Activity	Time in weeks (NT)	Crash Time (CT)	Normal Cost ₹	Crash Cost ₹	1-2	4	3	700	900	1-3	3	1	300	500	2-3	8	6	850	1120	2-4	4	2	550	1200	3-4	5	4	500	700	4-5	5	3	450	800																																				
Activity	Time in weeks (NT)	Crash Time (CT)	Normal Cost ₹	Crash Cost ₹																																																																					
1-2	4	3	700	900																																																																					
1-3	3	1	300	500																																																																					
2-3	8	6	850	1120																																																																					
2-4	4	2	550	1200																																																																					
3-4	5	4	500	700																																																																					
4-5	5	3	450	800																																																																					
7	a	Discuss in detail the various construction activities observed during visit to coastal road project. Consider planning, execution, environment, quality and safety in your discussion.	10	CO2	BL1	3.1.2																																																																			
	b	Following data refers to the Materials requirement of XYZ infra Ltd. Perform ABC analysis and classify the inventory into different categories.	10	CO3	BL2	1.3.1																																																																			
		<table><tr><th>Sr.No.</th><th>Item</th><th>Unit cost in Rs.</th><th>Annual demand</th></tr><tr><td>1</td><td>Flooring tile</td><td>280</td><td>5000</td></tr><tr><td>2</td><td>Admixture</td><td>190</td><td>600</td></tr><tr><td>3</td><td>Steel sections</td><td>90000</td><td>65</td></tr><tr><td>4</td><td>Stoneware pipe</td><td>330</td><td>1000</td></tr><tr><td>5</td><td>solid blocks</td><td>65</td><td>7500</td></tr><tr><td>6</td><td>Bricks</td><td>25</td><td>25000</td></tr><tr><td>7</td><td>Cement</td><td>450</td><td>50000</td></tr><tr><td>8</td><td>Fly ash</td><td>90</td><td>15420</td></tr><tr><td>9</td><td>Nano silica</td><td>300</td><td>800</td></tr><tr><td>10</td><td>GI Sheet</td><td>200</td><td>350</td></tr><tr><td>11</td><td>PVC pipe</td><td>350</td><td>700</td></tr><tr><td>12</td><td>Concrete pipe</td><td>9500</td><td>275</td></tr><tr><td>13</td><td>Lime</td><td>40</td><td>5000</td></tr><tr><td>14</td><td>Oil paint</td><td>650</td><td>400</td></tr><tr><td>15</td><td>Aluminum sections</td><td>330</td><td>1200</td></tr><tr><td>16</td><td>Ply wood</td><td>90</td><td>10000</td></tr></table>	Sr.No.	Item	Unit cost in Rs.	Annual demand	1	Flooring tile	280	5000	2	Admixture	190	600	3	Steel sections	90000	65	4	Stoneware pipe	330	1000	5	solid blocks	65	7500	6	Bricks	25	25000	7	Cement	450	50000	8	Fly ash	90	15420	9	Nano silica	300	800	10	GI Sheet	200	350	11	PVC pipe	350	700	12	Concrete pipe	9500	275	13	Lime	40	5000	14	Oil paint	650	400	15	Aluminum sections	330	1200	16	Ply wood	90	10000			
Sr.No.	Item	Unit cost in Rs.	Annual demand																																																																						
1	Flooring tile	280	5000																																																																						
2	Admixture	190	600																																																																						
3	Steel sections	90000	65																																																																						
4	Stoneware pipe	330	1000																																																																						
5	solid blocks	65	7500																																																																						
6	Bricks	25	25000																																																																						
7	Cement	450	50000																																																																						
8	Fly ash	90	15420																																																																						
9	Nano silica	300	800																																																																						
10	GI Sheet	200	350																																																																						
11	PVC pipe	350	700																																																																						
12	Concrete pipe	9500	275																																																																						
13	Lime	40	5000																																																																						
14	Oil paint	650	400																																																																						
15	Aluminum sections	330	1200																																																																						
16	Ply wood	90	10000																																																																						

P.T.O.

P.T.O.

TABLE 5-4

## Normal Distribution Function

Normal deviate (+)	Probability (%)	Normal deviate (+)	Probability (%)
0	50.0	0	50.0
-0.1	46.0	+0.1	54.0
-0.2	42.1	+0.2	57.9
-0.3	38.2	+0.3	61.8
-0.4	34.5	+0.4	65.5
-0.5	30.8	+0.5	69.2
-0.6	27.4	+0.6	72.6
-0.7	24.2	+0.7	75.8
-0.8	21.2	+0.8	78.8
-0.9	18.4	+0.9	81.6
-1.0	15.9	+1.0	84.1
-1.1	13.6	+1.1	86.4
-1.2	11.5	+1.2	88.5
-1.3	9.7	+1.3	90.3
-1.4	8.1	+1.4	91.9
-1.5	6.7	+1.5	93.3
-1.6	5.5	+1.6	94.5
-1.7	4.5	+1.7	95.5
-1.8	3.6	+1.8	96.4
-1.9	2.9	+1.9	97.1
-2.0	2.3	+2.0	97.7
-2.1	1.8	+2.1	98.2
-2.2	1.4	+2.2	98.6
-2.3	1.1	+2.3	98.9
-2.4	0.8	+2.4	99.2
-2.5	0.6	+2.5	99.4
-2.6	0.5	+2.6	99.5
-2.7	0.3	+2.7	99.7
-2.8	0.3	+2.8	99.7
-2.9	0.2	+2.9	99.8
-3.0	0.1	+3.0	99.9





Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**End Semester Examination**

**19<sup>th</sup> June 2023**

19/6/23  
19/6/23

**Program: UG Third Year**

**Course Code: PC-BT603**

**Course Name: Foundation Engineering**

**Duration: 3 Hours**

**Maximum Points: 100**

**Semester: VI**

**Notes:**

- **Question 1 is compulsory. Attempt any four out of remaining six questions**
- Assume suitable data if necessary and state it clearly
- Clearly write units everywhere. Points will be deducted in each place units are missing
- Figure on right indicate **maximum points** for the given question, **course outcomes attained**, and **Bloom's Taxonomy Level**

Q. No.			Points	CO	BL
1	a	Explain briefly the different modes of shear failure of a shallow foundation	5	2	2
	b	A bored pile foundation is to be constructed for an industrial unit proposed over cohesive soil. A junior engineer plans to use Engineering News formula to estimate the pile group capacity. What advice would you give him/her? Why?	5	3	5
	c	Classify various types of conduits with neat sketches	7	4	1
	d	Determine the coefficient of lateral earth pressure for at rest condition, active condition and passive condition for $\phi=35^\circ$ .	3	1	3
2	a	A rectangular footing of size 1.8m x 2.1m is located at a depth of 1.2m. The soil has $\gamma=16.8\text{kN/m}^3$ , $\phi=30^\circ$ and $c=10\text{kN/m}^2$ . Determine the safe bearing capacity as per IS code recommendations if water table is deep below ground surface. Assume depth and inclination factors = 1.0. See Figure 1 for bearing capacity factors.	5	2	3
	b	Describe in detail the Culmann's graphical method for estimation of active earth pressure.	5	1	1
	c	Design the embedment depth for a sheet pile constructed to retain 6 m of soil with density of $1.7\text{t/m}^3$ and friction angle of $30^\circ$ . Use the simplified method and assume ground water table to be very deep below the ground surface.	10	1	4
3	a	Draw the apparent pressure diagrams for cuts in sand and for cuts in stiff clay.	5	4	1
	b	Explain the advantages of a CPRF system over a typical mat foundation or a typical pile foundation system.	5	4	2
	c	A 3x3 pile group is driven in clay soil having unconfined compressive strength of 90 kPa. Assuming pile diameter of 300 mm and spacing of 3d,	10	3	3



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



		estimate the capacity of the 9 m long pile. Adhesion factor for the soil-pile interface is 0.75 and factor of safety is 2.5												
4	a	A 5 m high retaining wall retains soil with cohesion of 6.5 kPa, $\phi = 26^\circ$ and unit weight of 17.4 kN/m <sup>3</sup> . Calculate the resultant pressure on the wall if cracks occur.	5	1	3									
	b	What is negative skin friction? How can it be accounted for in pile design?	5	3	2									
	c	Proportion the area of a combined footing for two columns A and B with following details. <table border="1"><tr><td>Name</td><td>Column A</td><td>Column B</td></tr><tr><td>Size</td><td>40cmx40cm</td><td>40cmx40cm</td></tr><tr><td>Load</td><td>50 t</td><td>75t</td></tr></table> The allowable soil pressure is 6t/m <sup>2</sup> . The columns are spaced at 3.5m c/c. The footing should not extend beyond column A. Show the arrangement with all dimensions.	Name	Column A	Column B	Size	40cmx40cm	40cmx40cm	Load	50 t	75t	10	2	3
Name	Column A	Column B												
Size	40cmx40cm	40cmx40cm												
Load	50 t	75t												
5	a	Calculate the efficiency of a 3x4 pile group with 300 mm diameter piles, 15 m long and spaced at 3d constructed in clayey soil. Can the efficiency of piles in clay be considered as 1.0?	5	3	3									
	b	A wall footing is to rest on a soil having the following properties: $c$ (kN/m <sup>2</sup> ) = 12, $\phi$ (degrees) = 32, $\gamma_d$ (kN/m <sup>3</sup> ) = 16.9 and $\gamma_{sat}$ (kN/m <sup>3</sup> ) = 18.5. Determine the safe load on a 1m wide footing placed at 1.2 m below the ground surface if water table is located at 1.4 m below ground surface. Use IS code recommendations and neglect depth factors. Assume FOS as 3.0 See Figure 1	15	2	3									
6	a	A rigid water pipe of diameter 2.5 m is to be laid in a ditch which is 3.5 m wide at the top of the pipe. It is to be covered with 3 m of clayey backfill having unit weight of 19 kN/ m <sup>3</sup> . Calculate the load on the pipe if $C_d = 3.5$ . What will be the load if this pipe is flexible?	5	4	3									
	b	An excavation was being carried out for a foundation in plastic clay. The unit weight of the clay was 20 kN/ m <sup>3</sup> and it was observed that failure occurred when a depth of excavation of 3.5 m was reached. Determine the value of cohesion of the soil.	5	1	3									
	c	A 300 mm diameter pile is driven into a deposit of sand having $\phi=32^\circ$ , $\gamma_b=1.80$ g/cc, $\gamma_{sat}=1.95$ g/cc, $\text{ktan}\delta = 1.2$ and $N_q=34$ . The pile is driven to a length of 11.5 m and water table is located at 3 in below GL. Take critical depth of pile as 15d. Find the safe load the pile can carry.	10	3	3									
7	a	Show the major components of a reinforced earth wall with a neat sketch.	5	4	2									
	b	Discuss the limitations of a plate load test.	5	3	2									
	c	A smooth vertical wall 5 m high retains a soil with $c = 25$ kN/m <sup>2</sup> , $\phi = 30^\circ$ , and $\gamma = 18$ kN/m <sup>3</sup> . Show the Rankine passive pressure distribution and determine	10	1	3									



# Bharatiya Vidya Bhavan's SARDAR PATEL COLLEGE OF ENGINEERING

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



the magnitude and point of application of the passive resistance.

**IS 6403 : 1981**

**TABLE 1 BEARING CAPACITY FACTORS**  
( Clause 5.1.1 )

BEARING CAPACITY FACTORS			
$\phi$ (Degrees)	$N_c$	$N_q$	$N_\gamma$
0	5.14	1.00	0.00
5	6.49	1.57	0.45
10	8.35	2.47	1.22
15	10.98	3.94	2.65
20	14.03	6.40	5.39
25	20.72	10.66	10.89
30	30.14	18.40	22.40
35	46.12	33.30	48.03
40	75.31	64.20	109.41
45	138.88	134.88	271.76
50	266.89	319.07	762.89

NOTE — For obtaining values of  $N'_c$ ,  $N'_q$  and  $N'_\gamma$ , calculate  $\phi' = \tan^{-1}$  (0.67 tan  $\phi$ ). Read  $N_c$ ,  $N_q$  and  $N_\gamma$  from the Table corresponding to the value of  $\phi'$  instead of  $\phi$  which are values of  $N'_c$ ,  $N'_q$ ,  $N'_\gamma$  respectively.

5.1.2 The ultimate net bearing capacity obtained in 5.1.1 for strip footing shall be modified to take into account, the shape of the footing, inclination of loading, depth of embedment and effect of water table. The modified bearing capacity formulae are given as under:

- a) In case of general shear failure  $q_u$  } 
$$= cN_c s_{dc} i_{dc} + q(N_q - 1) s_{dq} i_{dq} + \frac{1}{2} B \gamma N_\gamma s_{d\gamma} i_{d\gamma} W'$$
- b) In case of local shear failure  $q'_u$  } 
$$= \frac{1}{2} cN'_c s_{dc} i_{dc} + q(N'_q - 1) s_{dq} i_{dq} + \frac{1}{2} B \gamma N'_\gamma s_{d\gamma} i_{d\gamma} W'$$

5.1.2.1 The shape factors shall be as given in Table 2.

**TABLE 2 SHAPE FACTORS**

Sl. No.	SHAPE OF BASE	SHAPE FACTOR		
		$s_c$	$s_q$	$s_\gamma$
i)	Continuous strip	1.00	1.00	1.00
ii)	Rectangle	$1 + 0.2 B/L$	$1 + 0.2 B/L$	$1 - 0.4 B/L$
iii)	Square	1.3	1.2	0.8
iv)	Circle	1.3	1.2	0.8

Use  $B$  as the diameter in the bearing capacity formula.

**Figure 1: IS 6403 – 1981 relevant clauses**







Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

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



End Sem – June 2023

Program: Civil Engineering

Course Code: PC-BTC604

Course Name: Design of RCC Elements

Duration: 3 hrs

Maximum Points: 100

Semester: VI

Notes:

T.Y. B. Tech (Sem-VI)

21/6/23

- 1) Attempt any five questions.
- 2) Draw reinforcement details wherever necessary.
- 3) Use of IS 456:2000 is permitted.

Q.No.	Questions	Points	CO	BL	Module No.
Q1	a) What do you mean by Limit State. State and explain the assumptions made in LIMIT State of collapse(Flexure).	05	1	2	3
	b) Derive design stress block parameters for singly RC sections for LSM of design subjected to flexure.	05	1	1,2	3
	c) Calculate load carrying capacity of column of size 500mmx600mm comprising of 8-32mm dia. Use M-30 and Fe-500.	05	1,2,3	2	6
	d) How much minimum and maximum reinforcement is provided in RC column section? What is the purpose of column ties?	05	1,2,3	2	6
Q2	a) RC section 300mmx700mm depth overall and reinforced with 3-20mm dia is used as simply supported beam over an effective span of 4.5m. Determine the maximum udl beam can carry safely. Use M 35 and Fe-500D	08	1,2,3	3	4
	b) Design RC beam of size 300x500 mm and span 4m subjected to service udl of 120kN/m. Use M-35 and Fe 500D	12	1,2,3	3	4
Q3	a) An isolated TEE beam section has an effective depth of 750mm, effective flange width of 1000mm, rib width of 300mm, slab depth of 125mm. Design the beam to carry ultimate moment of 1800kN-m. Use M-30 and Fe-500D.	12	1,2,3	3	4
	b) Design one way slab panel of a common passage of RCC residential building having dimensions 2.5m x 6m. Give appropriate checks. Use M30 and Fe 500D. Draw reinforcement details	08	1,2,3	3	5
Q4	a) Design a SIMPLY SUPPORTED RC slab for a balcony of a residential building. The size of panel is 4m x 5m. Draw bottom reinforcement plan and section along short span. Give appropriate checks. Use M35 and Fe 500D	20	1,2,3	3	5



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058



End Sem – June 2023

Q5		What are the functions of distribution steel in one way slab?	05	1,2, 3	2	5
	b)	Design short helically reinforced column to resist service load of 1600kN. Use M35 and Fe500D. Draw reinforcement details	15	1,2, 3	3	6
Q6	a)	A column of dimension 500mmx500mm is subjected to axial load of 1800kN. Design isolated footing for column assuming SBC as 225kN/m <sup>2</sup> . Use M35 and Fe 500D.	20	1,2, 3	3	7
Q7	a)	A rectangular beam 300mm x500mm effective depth is reinforced with 4 bars of 20mm dia in tension zone. The beam is subjected to udl of 70kN/m over span of 5m. Design shear reinforcement. Use M30 and Fe500D	10	1,2, 3	3	4
	b)	Determine ultimate load carrying capacity of column (300 x500)mm subjected to uniaxial bending reinforced with 4 bars of 20mm dia (each in one corner). Take $x_u = D$ . Assume $f_{sc} = 0.87f_y$ and $f_c = 0.446f_{ck}$ . Use M30 and Fe 415. Also find eccentricity of the load.	10	1,2, 3	3	6

\*\*\*\*\*



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058



**End Semester Exam – June 2023 Examinations**

**Program: B.Tech –Civil Engineering**

**Course Code: PC-BTC602**

**Course Name: Design Of Steel Structures**

**Duration: 3 Hour**

**Maximum Points: 100**

**Semester: VI**

**Notes:**

T.Y. B.Tech

1. Assume any missing data and state the same clearly
2. Use of IS 800-2007 and steel table is allowed
3. Draw neat sketches to illustrate your answers
4. For all steel plates and angles,  $f_y = 250\text{MPa}$ ,  $f_u = 410\text{MPa}$

12/6/23

Q.No.	Questions	Points	CO	BL	PI
1.	<p>The member of a roof truss carries the following unfactored loads :</p> <p>DL = 80kN (Tensile) LL = 60kN (Tensile) WL = 90kN (Compressive)</p> <p>a. What will be the design loads as per IS 800:2007 load combinations?</p> <p>b. Design the element as a tension member and also design its connection with 10mm thick gusset plate using 4.6grade bolts</p> <p>c. Check the member designed above for the safety in compression according to the load combinations generated.</p>	20	1,3,6	3,4	3.1.4 3.1.6
2.a)	<p>A single angle strut (loaded through single leg) has the following design forces acting DL = 65kN, LL = 55kN, both forces being compressive in nature. The length of member between centres of intersection is 1.95m. Design the section as per IS 800:2007. Assume the connection to be hinged with two bolts at each end</p>	10	1,3	3	3.1.4 3.1.6
2.b)	<p>A column carries a design axial load of 900kN. Design the column section using rolled steel section when One end is restrained against rotation and translation while other is restrained against translation only. Length of member is 4.5m</p>	06	3	3	3.1.4 3.1.6



Bharatiya Vidya Bhavan's

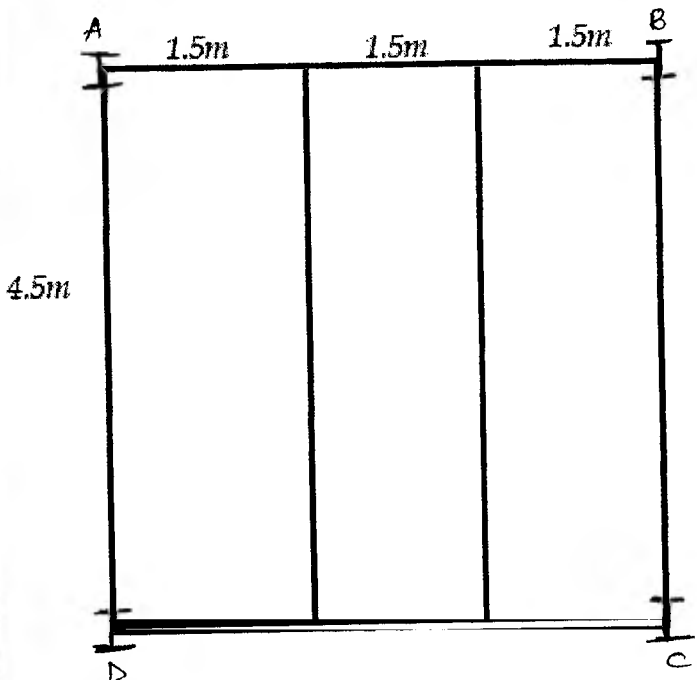
# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058



## End Semester Exam – June 2023 Examinations

2.c)	Explain the various failure modes of compression members	04	1	1,2	1.4.1 2.1.3
3.	Design a built up laced column to carry 1500kN design axial load using two channels facing back to back. Also design lacing and its connection using 4.6grade bolts. The column is hinged at both ends and the length is 4.0m. Draw neat sketch showing all the details	20	3	3	3.1.4 3.1.6
4.a)	<p>A floor of hall has beam layout as shown in figure below:</p>  <p>Design beam AB(<i>simply supported</i>). Loads are as follows : RCC slab depth = 100mm Floor finish load = <math>1.5\text{kN/m}^2</math> Live load = <math>2.5\text{kN/m}^2</math> Wall thickness = 230mm (All beams support walls of height 2.5m) Design the beam and provide all necessary checks <i>assuming the beam to be laterally supported</i></p>	14	1,5	3,4	3.1.4 3.1.6
4.b)	Explain the procedure for wind load calculations on roof truss	06	1,6	1,2	1.4.1 2.1.3



**End Semester Exam – June 2023 Examinations**

5.a)	Design a framed connection for an ISMB 300( <i>secondary beam</i> ) to transfer 115kN factored reaction to ISMB 400( <i>main beam</i> ) using 4.6grade bolts. Draw neat sketch to show connection details	10	2	3	3.1.4 3.1.6
5.b)	Explain the necessity of column bases. What is the use of steel base plate in column base ?	04	4	1,2	1.4.1 2.1.3
5.c)	Explain the advantages and disadvantages of welding	06	1	1,2	1.4.1 2.1.3
6.a)	Design a slab base connection for a column of section ISHB 300 to transfer a design load of 850kN on a concrete pedestal of M20 grade.	08	4	3	3.1.4 3.1.6
6.b)	Design a welded connection for a single angle tension member ISA 150x150x10. The angle is subjected to an axial force of 210kN.	08	2	3	3.1.4 3.1.6
6.c)	Explain various modes of failure in bolted joints	04	2	1,2	1.4.1 2.1.3
7.a)	Explain the classification of sections : plastic, compact, semi-compact and slender based on moment – rotation characteristics	06	1	1,2	1.4.1 2.1.3
7.b)	A simply supported beam ISMB 400 has been used over a span of 6.5m to carry a design load of 18.5kN/m. Check the safety of the beam in <i>shear, flexure and deflection</i> when the beam is <i>laterally unsupported</i>	10	5	3	3.1.4 3.1.6
7.c)	Calculate live load on truss if the angle of slope of roof is 45°.	03	1,6	1,2	1.4.1 2.1.3





Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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

**End Semester Examination**

**EVEN SEM June - 2023**



26/6/23

Program: Civil Engineering

Duration: 3 hour

Course Code: PE-BTC - 664

Maximum Points: 100

Course Name: Traffic Engineering and Control (Elective)

Semester: VI

T.Y.B.Tech

Q.No.	Questions	Points	CO	BL
Q.1.				
a.	Discuss the term (i) Spot Speed (ii) Running Speed (iii) Journey speed (iv) Space Mean Speed (v) Time Mean Speed	10	01	01
b.	The 30 minutes traffic count on cross road 1 & 2 during peak hour are observed as 280 vech/lane and 250 vech/lane respectively approaching the intersection in the direction of heavy traffic flow. Based on approach speed, If the yellow time required for road 1 & 2 are 3 second and 2 second respectively. Design the signal timing by trial cycle method. (Assume headway = 3 second during green phase for both the road). Also, Tabulate the result and draw phase diagram.	10	02	03
Q.2.				
a	Discuss the importance of economic evaluation of transportation project.	05	02	02
b	Discuss Advantages and Disadvantages of Traffic Signals	05	02	01
c	A single lane road 50 km long is to be widen to two lane road at the cost of 15 lakhs Rs/km including all the improvements. The cost of operation on single lane is 1.8 Rs. per vehicle per km. whereas, cost of operation on improved two lane is 1.2 Rs. per vehicle per km. The average traffic may be around 3500 vehicles per day over a design period of 15 years. the cost of maintenance is 5000 Rs. per km and 8000 Rs per km for existing single lane and improved two lane road respectively. Determine the improvement is worthwhile. (The interest rate is 9 % per annum)	10	02	03
Q.3				
a	Write short Notes on z - Test and T - test	08	02	02
b.	The spot speed study were carried out on the Nasik - Mumbai Highway before and after upgradation. The data related to average speed of vehicles are shown in the table below. Test the hypothesis	12	02	03



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**End Semester Examination**

**EVEN SEM June - 2023**

	at 5 % level of significance that there is improvement in the average speed due to upgradation. (Refer Table 1 and Table 2.)			
Q.4.				
a	Discuss about Transportation model for Optimization.	05	01	01
b	Discuss the balanced and unbalanced transportation problem with example.	05	02	02
c	For the construction of Flexible pavement. there are three sources A, B and C which can supply the materials to five destinations D, E, F, G and H. Monthly capacity of three sources A, B and C are 1000, 800, and 700 units respectively. Whereas, amount of monthly demand to five destinations D, E, F, G and H are 400, 400, 500, 400 and 800 units respectively. The unit transportation costs are given in table 3. Obtain the initial feasible solution to minimise the cost by (a) N-W corner method (b) Least cost Method	10	02	03
Q.5.				
a	What do you meant by Trip Generation. Discuss Home Based and Non home based Trip with an Example.	05	01	01
b	Discuss manual method of conducting traffic volume study.	05	01	01
c	The Trip pattern in four zones during O –D study is shown in O-D matrix. Determine future trip generated by (i) Uniform Growth Factor Method and (ii) Average Factor Method ( Refer Table 4)	10	02	03
Q.6				
a	The spot speed at particular location are normally distributed with mean of 51.7 km/hr and standard deviation of 8.3 km/hr. what is the probability that (i) Speed exceed 65 km/hr (ii) Speed lie between 40 km/hr to 70 km/hr (iii) What is 85 <sup>th</sup> percentile speed	10	02	03
b	Following table gives the particulars collected for a section of road of 0.70 km long during the course of moving observer study. Calculate the flow in PCU per hour in both direction of the traffic assuming an equivalency factor 1 for car, 2 for truck and 3 for bus. Calculate traffic flow, running speed and journey speed. Using the data given bellow. (Refer Table 5)	10	02	03





Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**End Semester Examination**

**EVEN SEM June - 2023**

Q.7.				
a	Discuss normal density function and standard normal density function of normal probability distribution curve.	05	02	02
b	Discuss the term regression and correlation	05	02	02
c	In the research study for development of maintenance policy, the condition state of the pavement decided based on the surface area of pot hole per and length and depth of rutting per km length of the road. The survey was carried out at 250 different sections, data analysed and relation between variation of speed and condition state of the pavement is presented in Table 6. Develop the regression equation for; i. Condition state of pavement from speed ii. Speed from condition state of pavement	10	02	03

**Q. 3 (b), Table 1. spot speed of vehicles before upgradation**

25	36	37	29	30	35	45	44	47	51
50	60	25	28	25	32	34	39	43	35
38	41	47	51	27	29	33	37	42	45
43	47	48	57	52	51	55	36	26	29

**Q. 3 (b), Table 2. spot speed of vehicles after upgradation**

35	58	47	65	47	36	38	44	55	44
55	44	61	60	47	61	36	51	37	47
45	52	49	37	68	40	39	40	47	57
47	38	63	65	43	61	59	42	52	60
48	57	43	63	39	70	39	45	41	51

**Q. 4. (c), Table 3.**

Source/destination	D	E	F	G	H
A	5	8	6	6	3
B	4	7	7	6	5
C	8	4	6	6	4



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**End Semester Examination**

**EVEN SEM June - 2023**

**Q. 5. (c) Table 4.**

O/D	1	2	3	4
1	75	160	225	300
2	200	125	300	175
3	170	260	75	200
4	110	300	120	140

**Q.6 (b). Table 5**

North Bound Traffic							
Trip No.	Journey time, minute	Stopped time, minute	Vehicle met with in the opposite direction			Vehicle in the same direction	
			Car	Bus	Truck	Overtaking	Overtaken
1	1.20	0.1	15	02	0	04	01
2	1.10	0.15	14	02	02	03	01
3	0.85	0.12	23	03	02	02	04
4	0.60	0.25	17	02	01	02	03
5	0.50	0.18	13	04	02	04	01
South Bound Traffic							
1	1.40	0.10	25	03	02	06	02
2	1.35	0.10	22	04	02	03	01
3	0.9	0.14	27	05	01	02	04
4	0.65	0.12	15	02	03	03	04
5	1.20	0.11	08	01	03	02	01

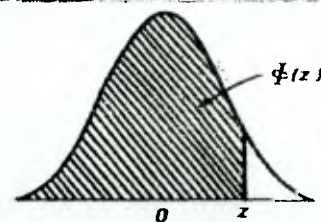
**Q.7 (c). Table 6**

Condition state	1	2	3	4	5
Speed km/hr	55	48	33	28	22

$z$	$\phi(z)$	$z$	$\phi(z)$	$z$	$\phi(z)$	$z$	$\phi(z)$	$z$	$\phi(z)$	$z$	$\phi(z)$
0.25	0.5987	0.60	0.7257	0.95	0.8289	1.40	0.9192	1.90	0.9713	2.40	0.99180
.26	.6026	.61	.7291	.96	.8315	.41	.9207	.91	.9719	.41	.99202
.27	.6064	.62	.7324	.97	.8340	.42	.9222	.92	.9726	.42	.99224
.28	.6103	.63	.7357	.98	.8365	.43	.9236	.93	.9732	.43	.99245
.29	.6141	.64	.7389	.99	.8389	.44	.9251	.94	.9738	.44	.99266
0.30	0.6179	0.65	0.7422	1.00	0.8413	1.45	0.9265	1.95	0.9744	2.45	0.99286
.31	.6217	.66	.7454	.01	.8438	.46	.9279	.96	.9750	.46	.99305
.32	.6255	.67	.7486	.02	.8461	.47	.9292	.97	.9756	.47	.99324
.33	.6293	.68	.7517	.03	.8485	.48	.9306	.98	.9761	.48	.99343
.34	.6331	.69	.7549	.04	.8508	.49	.9319	.99	.9767	.49	.99361
1.05	0.8531	1.55	0.9394	2.05	0.97982	1.50	0.9332	2.00	0.97725	2.50	0.99379
.06	.8554	.56	.9406	.06	.98030	.51	.9345	.01	.97778	.51	.99396
.07	.8577	.57	.9418	.07	.98077	.52	.9357	.02	.97831	.52	.99413
.08	.8599	.58	.9429	.08	.98124	.53	.9370	.03	.97882	.53	.99430
.09	.8621	.59	.9441	.09	.98169	.54	.9382	.04	.97932	.54	.99446
1.10	.8643	1.60	0.9452	2.10	0.98214	2.55	0.99461	2.75	0.99702	2.95	0.99841
.11	.8665	.61	.9463	.11	.98257	.56	0.99477	.76	.99711	.96	.99846
.12	.8686	.62	.9474	.12	.98300	.57	.99492	.77	.99720	.97	.99851
.13	.8708	.63	.9484	.13	.98341	.58	.99506	.78	.99728	.98	.99856
.14	.8729	.64	.9495	.14	.98382	.59	.99520	.79	.99736	.99	.99861
1.15	0.8749	1.65	0.9505	2.15	0.98422	2.60	0.99534	2.80	0.99744	3.00	0.99865
.16	.8770	.66	.9515	.16	.98461	.61	.99547	.81	.99752	.10	.99903
.17	.8790	.67	.9525	.17	.98500	.62	.99560	.82	.99760	.20	.99931
.18	.8810	.68	.9535	.18	.98537	.63	.99573	.83	.99767	.30	.99952
.19	.8830	.69	.9545	.19	.98574	.64	.99585	.84	.99774	.40	.99966
1.20	0.8849	1.70	0.9554	2.20	0.98610	2.65	0.99598	2.85	0.99781	3.50	0.99977
.21	.8869	.71	.9564	.21	.98645	.66	.99609	.86	.99788	.60	.99984
.22	.8888	.72	.9573	.22	.98679	.67	.99621	.87	.99795	.70	.99989
.23	.8907	.73	.9582	.23	.98723	.68	.99632	.88	.99801	.80	.99993
.24	.8925	.74	.9591	.24	.98745	.69	.99643	.89	.99807	.90	.99995
1.25	0.8944	1.75	0.9599	2.25	0.98778	2.70	0.99653	2.90	0.99813	4.00	0.99997
.26	.8962	.76	.9608	.26	.98809	.71	.99664	.91	.99819		
.27	.8980	.77	.9616	.27	.98840	.72	.99674	.92	.99825		
.28	.8997	.78	.9625	.28	.98870	.73	.99683	.93	.99831		
.29	.9015	.79	.9633	.29	.98899	.74	.99693	.94	.99836		
1.30	0.9032	1.80	0.9641	2.30	0.98928						
.31	.9049	.81	.9649	.31	.98956						
.32	.9066	.82	.9656	.32	.98983						
.33	.9082	.83	.9664	.33	.99010						
.34	.9099	.84	.9671	.34	.99036						
1.35	0.9115	1.85	0.9678	2.35	0.99061						
.36	.9131	.86	.9686	.36	.99086						
.37	.9147	.87	.9693	.37	.99111						
.38	.9162	.88	.9699	.38	.99134						
.39	.9177	.89	.9706	.39	.99158						

Table 8-11

The Normal Distribution Function



Q. 6. a.

$z$	$\phi(z)$	$z$	$\phi(z)$	$z$	$\phi(z)$
0.00	0.5000	0.35	0.6368	0.70	0.7580
.01	.5040	.36	.6406	.71	.7611
.02	.5080	.37	.6443	.72	.7642
.03	.5120	.38	.6480	.73	.7673
.04	.5160	.39	.6517	.74	.7704
0.05	0.5199	0.40	0.6554	0.75	0.7734
.06	.5239	.41	.6591	.76	.7764
.07	.5279	.42	.6628	.77	.7794
.08	.5319	.43	.6664	.78	.7823
.09	.5359	.44	.6700	.79	.7852
0.10	0.5398	0.45	0.6736	0.80	.7881
.11	.5438	.46	.6772	.81	.7910
.12	.5478	.47	.6808	.82	.7939
.13	.5517	.48	.6844	.83	.7967
.14	.5557	.49	.6879	.84	.7995
0.15	0.5596	0.50	0.6915	0.85	0.8023
.16	.5636	.51	.6950	.86	.8051
.17	.5675	.52	.6985	.87	.8078
.18	.5714	.53	.7019	.88	.8103
.19	.5753	.54	.7054	.89	.8133
0.20	0.5793	0.55	0.7088	0.90	0.8159
.21	.5832	.56	.7123	.91	.8186
.22	.5871	.57	.7157	.92	.8212
.23	.5910	.58	.7190	.93	.8238
.24	.5948	.59	.7224	.94	.8264







Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

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



**END SEM Examinations June 2023**

**Program: Civil Engineering**

**Duration: 3hr**

**Course Code: PE-BTC644**

**Maximum Points: 100**

**Course Name TQM and MIS in construction**

**Semester: VI**

**Instructions:**

*T.Y. B.Tech*

*Wp/b/23*

1. Attempt any five questions.
2. Use A-4 size graph paper to draw control chart
3. Neat diagrams must be drawn wherever necessary.
4. Assume Suitable data if necessary and state it clearly.

Q. No.		Questions	Points	CO	BL	PI
1	a	Define quality as per ISO. Discuss various dimensions of quality.	8	CO1 CO3	BL3	1.4.1
	b	What is Quality Audit? What are the points to be taken into account while making Audit plan.	8	CO1	BL3	1.3.1
	c	What is a certification body? Enlist any four names of the Accreditation agency.	4	CO2	BL1	1.4.1
2	a	What do you mean by Non-conformity? What are the Common causes of non-conformity in construction project.	10	CO1	BL2	1.4.1
	b	Discuss the following principles of QMS in brief i) Customer focus; ii) Leadership; iii) Continual improvement and iv) Factual approach to decision making	10	CO2	BL5	2.3.1
3	a	What are the hurdles for implementing TQM construction sector?	4	CO2	BL2	1.4.1
	b	Discuss benefits of ISO to an organization.	4	CO1	BL2	1.3.1
	c	A RMC plants produces daily concrete of 500 cubic meter per day. Following are the observed slump values of 5 samples to measure the workability of concrete at different time intervals. Develop mean & range chart and comment on the process.	12	CO2	BL4	2.3.1

## Observations sheet for RMC plant

Day	Observed workability of concrete at different time intervals				
	8.00-10.00	10.00-12.00	12.00-14.00	14.00-16.00	16.00-18.00
1	170	185	169	194	180
2	185	205	189	224	201
3	162	169	175	158	166
4	194	178	169	154	174
5	210	201	184	177	193
6	165	210	185	175	184
7	170	166	174	169	170
8	154	184	167	184	172
9	160	177	186	154	169
10	215	167	158	168	177

4	a	Discuss in details the process of audit execution.	08	CO2	BL2	2.1.1
	b	Shimaro International Ltd., produces thousands of RCC Hume pipe every day. A Quality inspector randomly draws samples for 20 days and reports the defective pipes for each sample size. Based on the given data, prepare the control chart for the fraction defective and determine the process in statistical control.	12	CO1	BL2	2.1.2

**Observations sheet for Shimaro International Ltd**

Lot	Sample size	Number of defective pipes in the sample	Lot	Sample size	Number of defective pipes in the sample
1	1400	18	11	1400	13
2	1400	15	12	1400	19
3	1400	16	13	1400	33
4	1400	13	14	1400	20
5	1400	8	15	1400	22
6	1400	6	16	1400	20
7	1400	18	17	1400	17
8	1400	14	18	1400	19
9	1400	22	19	1400	23
10	1400	12	20	1400	34

5	a	Define TQM. Explain the various elements of TQM.	10	CO4	BL2	1.3.1
	b	What is review meeting? What are the requirements to be fulfilled by management to conduct review meeting according to ISO 9001.	10	CO1	BL3	2.1.1
	a	What is cost of Quality? Distinguish between cost of Good Quality and cost of poor Quality.	05	CO4	BL2	2.1.2
	b	Explain in short different types of audit.	03	CO2	BL1	2.1.2
	c	A company manufactures precast RCC components for mass housing complex with production capacity of 500 units per day. Defects in each components are recorded during testing. Based on the given data, draw the appropriate control chart and comment on the state of control.	12	CO3	BL4	2.3.1

**Observations sheet for RCC Components**

Lot	Sample size	No. of defects in the sample	Lot	Sample size	No. of defects in the sample	Lot	Sample size	No. of defects in the sample
1	500	12	11	500	23	21	500	18
2	500	14	12	500	19	22	500	14
3	500	16	13	500	31	23	500	16
4	500	18	14	500	20	24	500	17
5	500	32	15	500	26	25	500	24
6	500	25	16	500	24	26	500	22
7	500	18	17	500	17	27	500	28
8	500	14	18	500	18	28	500	26
9	500	22	19	500	27	29	500	24
10	500	12	20	500	29	30	500	25

7

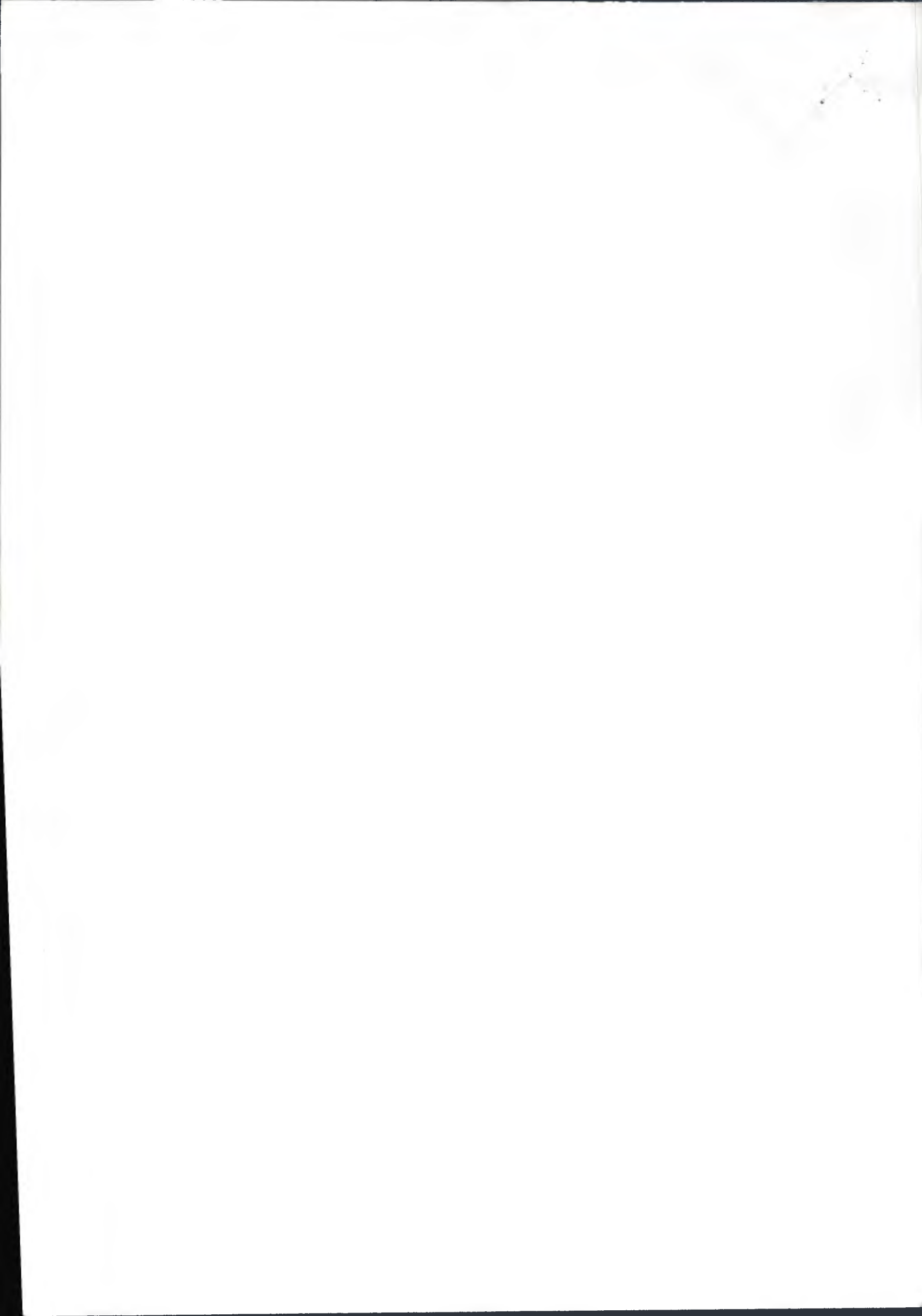
a	Discuss in detail the section 6 " <i>Resource management</i> " as per ISO 9001.	10	CO2	BL1	3.1. 2
b	A QC engineer inspected the flooring work in different rooms (Living Room, Bed Room 1, Bed Room 2, Kitchen) in a residential tower comprises of G+30 Storied. Following defects were observed in the flooring work: (Note: If there are six flat on each floor, determine the Six sigma value of a construction project by referring Standard table pasted below :).	10	CO3	BL2	1.3. 1

Types of defect in flooring	Living Room	Bed Room 1	Bed Room 2	Kitchen
1.Tiles gets popped up	14	12	9	8
2.Shade Variation in Tiles	21	15	13	16
3.Chipped Tiles	19	07	12	6
4.Crazing on Tiles	9	11	14	12
5.Size Variation in Tiles	17	21	12	16
6.Bowing Defect	9	8	4	7
7.Surface hollowness Defects	54	41	22	26

Sigma Level	Defects per Million Opportunities	Percentage Yield
1 $\sigma$	691,462	31
2 $\sigma$	308,537	69
3 $\sigma$	66,807	93.3
4 $\sigma$	6,210	99.38
5 $\sigma$	233	99.977
6 $\sigma$	3.4	99.99966

### Reference table for Mean and Range Chart

Tabular values for X-bar and range charts				
Subgroup Size	A <sub>2</sub>	d <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>
2	1.880	1.128	----	3.268
3	1.023	1.693	----	2.574
4	0.729	2.059	----	2.282
5	0.577	2.326	----	2.114
6	0.483	2.534	----	2.004
7	0.419	2.704	0.076	1.924
8	0.373	2.847	0.136	1.864
9	0.337	2.970	0.184	1.816
10	0.308	3.078	0.223	1.777
11	0.285	3.173	0.256	1.744
12	0.266	3.258	0.283	1.717
13	0.249	3.336	0.307	1.693
14	0.235	3.407	0.328	1.672
15	0.223	3.472	0.347	1.653
16	0.212	3.532	0.363	1.637
17	0.203	3.586	0.378	1.622
18	0.194	3.640	0.391	1.608
19	0.187	3.689	0.403	1.597
20	0.180	3.735	0.415	1.585
21	0.173	3.778	0.425	1.575
22	0.167	3.819	0.434	1.566
23	0.162	3.858	0.443	1.557
24	0.157	3.895	0.451	1.548
25	0.153	3.931	0.459	1.541





**Program: T.Y. Civil Engineering (UG)****Duration: 03 Hrs.****Course Code: PE-BTC 633****Maximum Points: 100****Course Name: Professional Elective-II: Open Channel Flow****Semester: VI****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**.

26/6/23

Q. No.	Questions	Points	CO	BL	PI
1	(a) Explain: Prismatic and Non-prismatic channels, Steady and unsteady flow, Uniform and non-uniform flow and critical, subcritical and supercritical flow.	10	3	2	1.3.1
	(b) What do you understand by hydraulically efficient channel? Derive an expression for hydraulically efficient triangular channel.	10	3	2	1.3.1
2	(a) In a rectangular channel, prove that; for a critical state of flow: $V/\sqrt{g.y} = 1$ , where $V$ = velocity of flow, $g$ = acceleration due to gravity and $y$ = depth of flow in the channel.	10	1	3	2.1.2
	(b) Design most economical trapezoidal channel section for a discharge of 25 cu.m. per sec, bed slope of channel is 1 in 1600 and Manning's constant = 0.019. Take side slope as 1H: 1V.	10	1	5	1.1.2
3	(a) Explain the significance of Specific energy, momentum equation and Specific force in an open channel flow.	10	1	2	2.1.3
	(b) Derive discharge expression for flow through Venturiflume. Also explain its working with neat sketch.	10	1	2	2.1.3
4	(a) Derive: differential equation for gradually varied flow. State assumptions clearly.	10	2	2	2.3.1
	(b) Determine the length of back water curve caused by afflux of 1.30 m in a rectangular channel width 50 m and depth 2.0 m The slope of the bed is given as 1 in 2250. Take Manning's $N = 0.022$ .	10	2	3	2.4.1
5	(a) Explain flow profiles in case of mild sloped channel.	10	2	2	3.2.1
	(b) Classify: hydraulic jump and derive an expression for loss of energy in hydraulic jump.	10	2	2	3.2.1
6	(a) A wide rectangular channel of width 1.80 m carries a discharge of 2.00 m <sup>3</sup> /s at a depth of 0.20 m Calculate: Specific energy, alternate	10	2	5	4.1.1



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

**End Semester Examinations June 2023**

**(2022-23)**



	depths and Froude numbers at alternate depth.				
	(b) Explain: Computation of Gradually Varied Steady Flow using Direct step method.	10	2	2	5.1.2
7	(a) Explain differential Equation of spatially varied flow for: (i) increasing discharge; and (ii) decreasing discharge with its applications	10	2	4	5.1.2
	(b) Explain in brief about incipient motion, mechanism of sediment Transport and sediment load.	10	2	4	5.1.2

\*\*\*\*\*



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai -- 400058



End Semester Examinations: June 2023

T.Y. B.Tech

Program: B.Tech. in Civil Engineering

Course Code: PE-BTC621

Course Name: Analysis of Indeterminate Structures

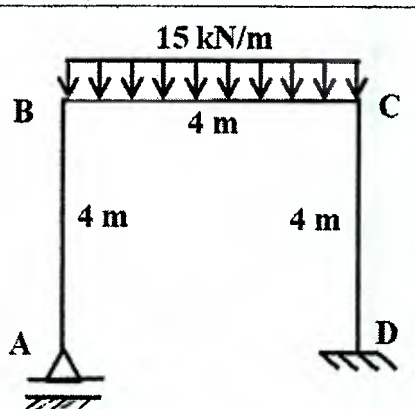
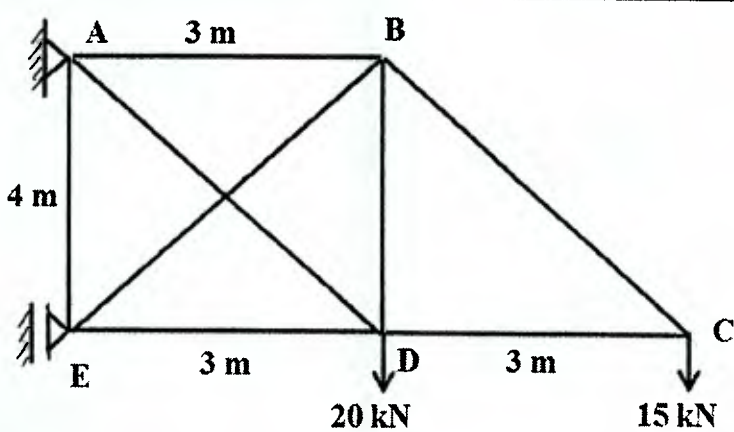
Duration: 3 Hours

Maximum Points: 100

Semester: VI

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.

*Handwritten signature/initials*

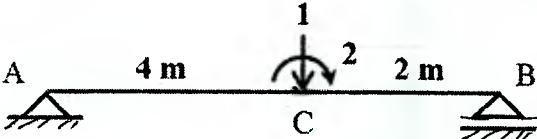
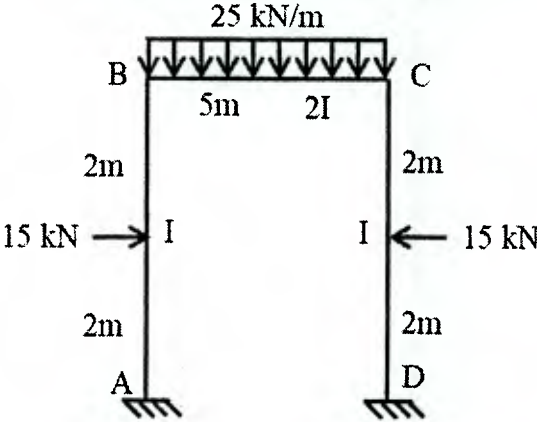
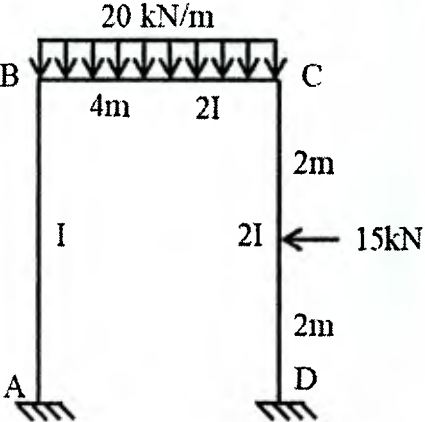
Q.No	Questions	Points	CO	BL	PI
Q1(a)	Find the reaction at A in the frame shown in figure using flexibility method.	10	1	3,4	1.3.1 2.1.3
					
Q1(b)	Find the force in the redundant member AD of the truss loaded as shown in figure below by flexibility (compatibility) method. (Take force in member AD as the redundant force.) Assume AE to be same for all the members.	10	1	3,4	1.3.1 2.1.2 2.1.3
					



Q2(a)	Analyse the continuous beam shown in figure using three moment theorem and find the support moments at A and B.	12	1	4	1.3.1 2.1.2
Q2(b)	A two hinged parabolic arch of span 30 m and rise 5 m carries a concentrated load of 30 kN at a distance of 7 m from the left support. Determine the horizontal thrust in the arch. The moment of inertia (MI) of the section of the arch varies as $I = I_0 \sec \theta$ , where $I_0$ = MI of the section at the crown.	08	1	3,4	1.1.1 1.3.1 2.4.1
Q3(a)	Find the reactions at B and C in the beam loaded as shown in figure using the theorem of least work.	12	1	3,4	1.3.1 2.1.3
Q3(b)	Name any two methods of (a) Force method (b) Displacement method	04	1,2	1,2	1.3.1
Q3(c)	Explain the advantages and disadvantages of indeterminate structures over determinate structures	04	1,2	1,2	1.3.1
Q4(a)	Find the unknown displacements in the frame shown in the figure below by slope deflection method.	12	2	3,4	1.3.1 2.1.2





Q4(b)	Calculate the stiffness coefficients and write the stiffness matrix for the frame shown in figure w.r. to the coordinates indicated in the figure.	08	2	3,4	1.3.1 2.1.2 2.1.3
					
Q5	Analyse the rigid jointed frame loaded as shown in the figure below by moment distribution method.	20	2	3,4	1.3.1 2.1.2
					
Q6(a)	Using stiffness method, find the unknown displacements in the rigid jointed frame loaded as shown in the figure below.	14	2	3,4	1.3.1 2.1.2 2.1.3
					
Q6(b)	What are the assumptions made in the plastic theory of bending?	06	3	1,2	1.3.1



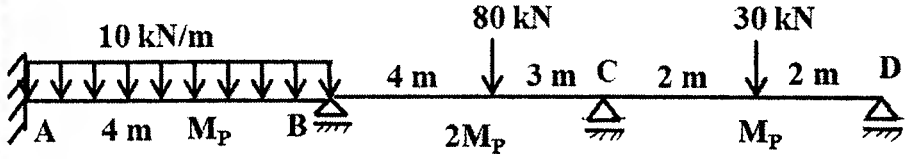
Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

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



**End Semester Examinations: June 2023**

Q7(a)	Find the shape factor for the unsymmetrical I section with the following data. Top flange - width = 250 mm, thickness = 25 mm Bottom flange - width = 250 mm, thickness = 25 mm Depth of web = 300 mm, thickness of web = 30 mm.	10	3	3,4	1.3.1 2.1.2
Q7(b)	A continuous beam is subjected to working loads as shown in figure below. If $M_P = 60$ kN-m, calculate the (true) load factor for the beam.	10	3	3,4	1.3.1 2.1.2
					



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester June 2023 Examinations



Program: B. Tech. Civil Engineering

Duration: 3hrs.

Course Code: PE-BTC622

Maximum Points: 100

Course Name: GIS Science & Applications

Semester: VI

Notes:

T. Y. B. Tech

1. There are **TOTAL SEVEN MAIN** questions, each of **20 points**.
2. **QUESTION 1 and 2 is COMPULSORY.**
3. **From the remaining Five Questions Solve ANY THREE.**
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.

23/6/23

Q.No.	Question	Points	CO	BL
1	<b>Answer the following:</b> a. Define GIS and explain its key components and functionalities. (4) b. Describe the difference between raster and vector data models in GIS. (4) c. Discuss how spatial and non-spatial data integration is important for any GIS. (4) d. Discuss the importance of metadata in GIS. (4)	20	1 to 4	1,2
2	As a geospatial consultant, you have to develop a map of D.N.Nagar, Andheri west for your client who is a real estate developer. The map should show a "least cost and shortest path analysis" from his proposed building site address to the nearby amenities, say hospitals. Write a proposal / project report explaining: 1. Data you have considered for analysis and mapping (5) 2. Methodology (flowchart) showing the number of hospitals within a radius (buffer) of 5kms from the proposed building site. (5) 3. Methodology (flowchart) showing the determination of shortest path. (5) 4. Methodology (flow-chart) for calculating the cost required for reaching the hospital from the proposed site. (5) The spatial analysis is to be carried out using an open source GIS, Quantum GIS (QGIS).	20	5	1,2,3
3	a. Discuss in short the concept of spatial analysis in GIS (2) and provide examples of vector analysis tools – Intersect, Clip, and Buffer. (06) b. Write a note on Topology building. (06) c. Discuss the applications, challenges and limitations of WebGIS	20	3,4	1,2,3



Bharatiya Vidyapeeth's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**End Semester June 2023 Examinations**

	technology in terms of data quality, privacy, and ethical considerations. (06)			
4	a. Describe the process of data acquisition in GIS, including primary and secondary data sources. (10) b. Write note on: i. Geo-referencing an image (5) ii. Map projection – importance and types (5)	20	1,3	1,2,3
5	a. Define Geodesy (2) and explain how important it is for any GIS (2). b. Discuss method of run length and block encoding for raster data storage. (8) c. Explain the concept of geodatabases in GIS (8)	20	1,3	1,2,3
6	a. Explain the concept of database management in GIS (6) and provide examples of relational and network database. (6) b. Differentiate between Desktop GIS, Internet GIS, and WebGIS (8)	20	3,4	1,2,3
7	a. Explain vector data structure and its types. (08) b. Explain the use of logical operators in spatial analysis. (06) c. Define and describe Triangulated Irregular Network (TIN). (6)	20	3,4	1,2,3





Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAMINATION**

**EVEN SEM JUNE - 2023**

T. Y. B. Tech

**Program: Civil Engineering**

**Course Code: PE-BTC - 661**

**Duration: 3 hour**

**Maximum Points: 100**

**Course Name: Pavement Subgrade and Materials (Elective) Semester: VI**

23/6/23

Q.No.	Questions	Points	CO	BL
Q.1.		20		
a.	Desirable Properties of Subgrade Soil	05		
b.	Discuss classification of the subgrade soil as per Revised Public Road Administration (PRA) system	05		
c.	Discuss the term Group Index.	05		
d.	The particle size distribution and index properties of subgrade soil are shown in the table – I. Calculate Group Index value	05		
Q.2.				
a.	The four days soaked CBR test conducted on two specimens and the load – penetration values are given in the table - II. Determine the CBR value of subgrade soil.	08		
b.	Discuss the term i. Unconsolidated Undrained test ii. Consolidated Undrained test iii. Consolidated Drained test	06		
c.	Discuss advantages and disadvantages of direct shear test	06		
Q.3.				
a.	Discuss the procedure of conducting plate bearing test in field. How will you apply the correction for plate size and subgrade moisture?	10		
b.	Plate Bearing Test conducted on subgrade soil using 30 cm diameter plate. The load value and corresponding average dial gauge readings are given in the Table - III. Determine the modulus of subgrade reaction. Apply the correction for plate size.	10		



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAMINATION**

**EVEN SEM JUNE - 2023**

Q.4.				
a	List out the different test and corresponding desirable properties for road aggregates	06		
b	Discuss the effect of flaky and elongated aggregate in road construction.	04		
c	The specimens of diameter 10 cm and height 200 cm tested for the unconsolidated undrained triaxial test. The axial strain and corresponding proving ring reading in kg at each confining pressure of 0.4 kg/cm <sup>2</sup> is shown in Table - IV. Apply necessary correction for cross sectional area and calculate Deviatoric stress. Also, plot a graph of Deviatoric stress verses axial strain curve and calculate initial modulus of elasticity.	10		
Q.5.				
a.	Discuss the design approach for surface drainage system of highway in open area.	08		
b	The surface water from the road side is drained to longitudinal side drain. From across the half of bituminous surface of total width 7.0 m, the shoulder and adjoining land on one side of drain is 10 m and on other side of longitudinal drain the water flow across from reserved land with grass and 2 % cross slope to words side drain. The width of strip of reserved land is 30 m. The runoff coefficient for pavement, shoulder and reserved land with gross cover is 0.80, 0.30 and 0.38 respectively. The length of stretch of land parallel to road from where water is expected to flow to the side drain is 500 m. Estimate the quantity of runoff flowing through longitudinal drain. Also design the longitudinal drain. Take $n = 0.022$ , $v = 0.50$ m/sec. (1) Period of frequency = 25 years.	12		



Bharatiya Vidya Bhavan  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAMINATION**

**EVEN SEM JUNE - 2023**

Q.6.				
a	Discuss with neat sketch distribution of stress in single layer and two layer system.	05		
b	Discuss the use of fly ash in Highway construction	05		
c	the grain size distribution for foundation soil indicates that the percentage of particle finer than 0.30, 0.20, 0.08, 0.04, 0.02, 0.01, mm size are 95%, 85%, 65%, 45%, 15%, 5%, respectively. If the perforated pipe used as a drain pipe with 5mm diameter, draw a grain size distribution for foundation material. Also draw the grain size distribution curve for filter material to be used around perforated pipe.	10		
Q.7.				
a.	Discuss the use of Geotextiles and geogrid in highway pavement construction.	06		
b.	Enlist the objectives of stabilization. Discuss Mechanical stabilization technique.	06		
c.	The percentages of material passing are given in Table - V. Calculate the proportion of mix for recommended range which gives maximum density. (use CRR method)	08		

Q. 1. (d), Table - I		
Properties of subgrade soils	Soil - A	Soil - B
passing 75 micron	70 %	55 %
Liquid limit	75 %	50 %
plastic limit	55 %	41 %



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAMINATION**

**EVEN SEM JUNE - 2023**

**Q. 2. (a), Table - II**

Dial gauge reading in mm	Proving ring reading in kg	
	Specimen - I	Specimen - II
0.0	0.0	0.0
0.5	15.2	0.95
1.0	28.2	2.85
1.5	43.7	4.75
2.0	55.1	11.4
2.5	64.6	24.7
3.0	70.3	36.0
4.0	81.7	57.0
5.0	91.2	72.2
7.5	108.3	95.0
10.0	119.7	110.2
12.5	127.3	119.7

**Q. 3. (b), Table - III**

Mean dial gauge reading in mm	0	0.30	0.55	0.80	1.12	1.40	1.75	2.10	2.20	2.25
Load value in kg	0	600	1200	1350	1810	1960	2110	2200	2280	2370

**Q. 4. (c), Table - IV**

Axial strain in percentage, $\epsilon$	Proving ring reading in kg at confining pressure $\sigma_3 = 0.4 \text{ kg/cm}^2$
0.5	1.2
1.0	15
1.5	25
2	37
2.5	50
3	62
4	75
5	88
6	98
7	105
8	112
9	117
10	118





Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAMINATION**

**EVEN SEM JUNE - 2023**

Q. 7. (c), Table - V			
Sieve size, mm	Percentage passing		recommended range
	Material - A	Material - B	
40	95	---	100
20	70	---	85-100
10	21	---	65-100
4.75	11	100	55-85
2.36	7	85	40-70
0.425	20	35	25-45
0.075	0	0	10-25

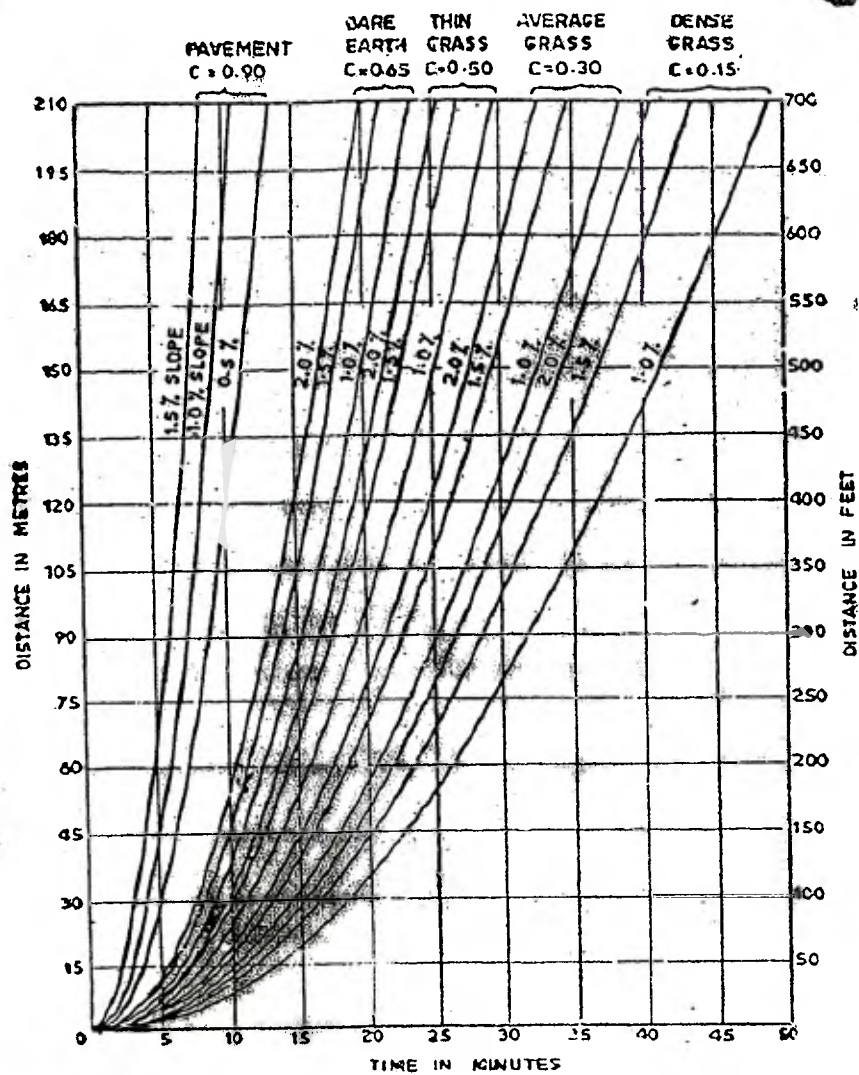


Figure 14.7 Inlet Time Curves

Q. 5. (b).

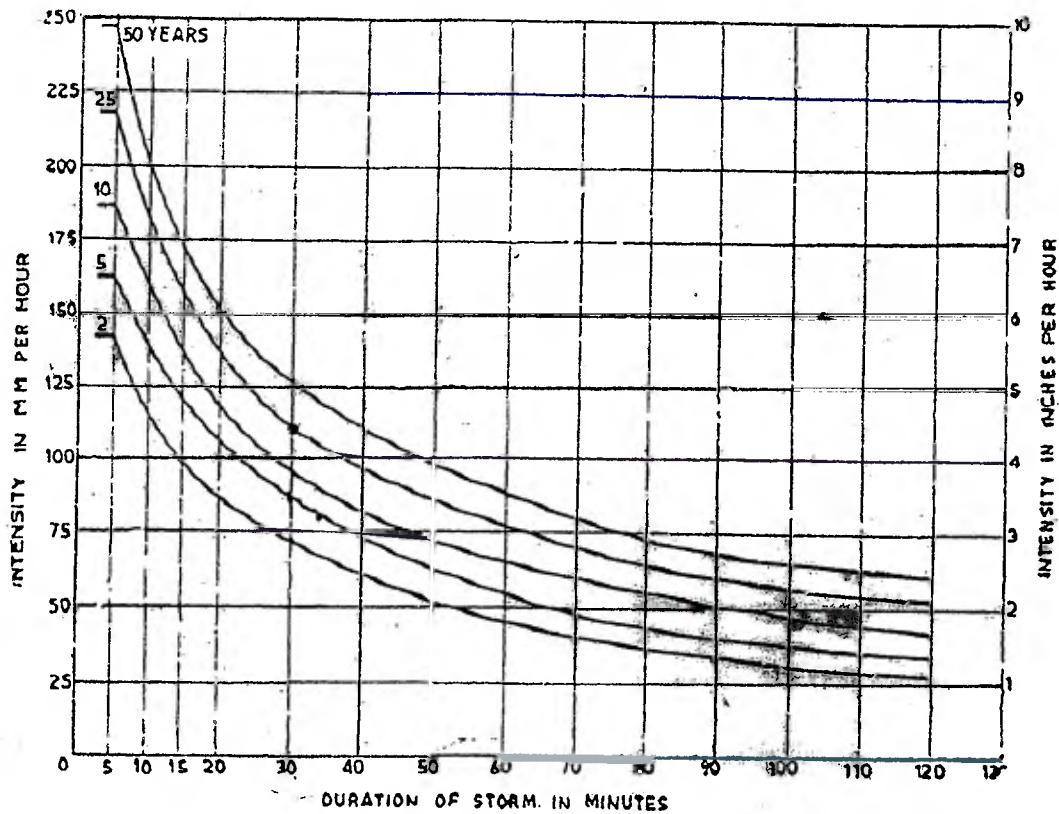


Figure 14.8 Typical Rainfall Intensity-Duration Curves



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAM**

**JUNE 2023**

Program: CIVIL ENGINEERING

Duration: 3hrs

Course Code: PE-BTC651

Maximum Points: 100

Course Name: Solid and Hazardous Waste management

Semester: VI

**NOTE:**

1. Q.1 is compulsory & solve any four out of remaining six questions

T. Y. B. Tech (Civil) (Sem VI)

Q.No.	Questions	Points	CO	BL	Module No.
1	Write a short note on(Any four) 1) Requirements of hazardous waste containers. 2) Pyrolysis of solid waste. 3) Factors affecting the solid waste generation rate. 4) Mechanical Volume reduction methods for solid waste 5) Biomedical waste segregation and treatment chart 6) Labeling format of container of hazardous waste and other waste	20	1-4	BLI	1-7
2	A. Discuss the effects of solid waste on environment and Classification of solid wastes in detail. B. Explain physical and chemical characteristics of municipal solid waste. (Any three) C. Explain the role and place of solid waste transfer station in integrated solid waste management system.	8+6+6	1,3	BLI	1,2,3
3	A. Define: Solid waste and solid waste management . Explain the various types of collection services employed in integrated solid waste management. B. Solid waste from a new industrial park is to be collected in large containers, some of which will be used in conjunction with stationary compactors. Based on traffic at similar parks, it is estimated that the average time to drive from the garage to the first container and from the last container to garage each day will be (t <sub>1</sub> ) 15 and (t <sub>2</sub> ) 20 min, respectively. If the average time required to drive between containers is 6 min (dbc) and the one way distance to the disposal site is 15.5 mi/h for which speed limit is 55 mi/h (88.5 km/h) .Assume 8-hour workday determine the number of containers emptied per day. pc+uc - 0.4 hour/trip, H= 8,dbc – 6 min , Given S=0.133; a=0.016; b=0.018; Assume off route factor (W) as 0.15. Determine pick up time per trip, time per trip,	10+4+6	1,3	BLI BLII	1,2,3



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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

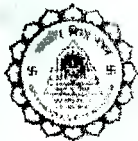


**END SEMESTER EXAM**

**JUNE 2023**

	number of trips per day, actual length of work day. C. Write a short note on: Stationary Container system.				
4	A. Draw and explain Sanitary landfills in detail. B. Write down any four problems associated with collection of solid waste in metro cities. C. "Composting of solid waste proved best disposable option of integrated Solid waste management" Justify above statement with working principle, methods, types and advantages of composting process.	8+4+8	1-3	BLII BLI	3,4
5	A. Discuss the incineration of solid waste based on following points, 1. Meaning of Incineration of solid waste 2. Objectives of Incineration of solid waste 3. Working principle of municipal incinerator 4. Types of incinerators 5. Advantages/Disadvantages B. Discuss the onsite handling, storage and processing of solid waste as per Municipal solid waste management rules 2016.	20	1-4	BLII	4
6	A. Define: Hazardous waste. Explain flammable and toxicity characteristics of hazardous waste in detail as per Hazardous and other waste (Management and trans boundary movement) rules, 2016. B. Explain physical and chemical treatment options available for hazardous waste. C. Make a list of various components of integrated common hazardous waste treatment storage and disposal facility (CHWTSDF)	8+8+4	1-3	BLI BLII	6
7	A. "INDIA recycles only 30% of 3.4 MT plastic waste generated annually" Discuss how Plastic waste management rules 2016 increases responsibility and awareness about management of plastic waste. B. Write a short note on: Electronic waste management rules 2016.	20	3,4	BLI BL II	5





Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**End Semester June 2023 Examinations**

**Program: T.Y. B. Tech. Civil /Mech./ Elect. Engineering**

**Course Code: OE-BTC612**

**Course Name: Sustainable Development**

**Duration: 3hrs.**

**Maximum Points: 100**

**Semester: VI**

**Notes:**

1. There are **TOTAL SEVEN MAIN** questions, each of **20 points**.
2. **QUESTION 1 and 2 is COMPULSORY.**
3. **From the remaining FIVE Questions Solve ANY THREE.**
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.

*2/6/23*

Q.No.	Questions	Points	CO	BL	PI
1.	<b>Answer the following:</b> <b>A. Define: (2 points for each)</b> 1. Carbon Trading 2. Global warming 3. Green-house effect <b>B. Name any two: (2 points each)</b> 1. Green building rating systems 2. Conference of Parties (COP) <b>C. State the following: (2 points each)</b> 1. Kyoto protocol – Flexibility Mechanisms 2. SDG 10 and SDG 13 (only topic) 3. Six broad outcomes of UNDAF 2013-17 4. SDG Index score of India for the year 2019-20 and 2020-21 5. Any 2 (out of 12) guiding principles of SD Strategy	20	1,2,3,4	1	7.1.1
2.A	Recently, our institute's Sustainability & Green Initiative Chapter had organized a talk on sustainable development and the environment by a Social Activist, Ms. Medha Patkar. She emphasized the necessity of balancing – economic, environment and social performances and suggested a few sustainable ways one should adopt considering the social responsibility towards sustainable environment. Discuss your comprehensive understanding about the social responsibility towards sustainable development that you have learned from the talk.	10	2	2,3	7.1.2
2.B	As a part of the learning of this course OE-BTC612, you have to narrate / give detailed report of any one of the activities (site visit / case study / project) that you have carried out aiming towards any one or more than one Sustainable Development Goals (SDG).	10	4	2	7.1.4



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



## End Semester June 2023 Examinations

3.A	Define 'Sustainability Assessment' (SA). (2) State and explain the general (4) and scalable (6) requirements of Sustainability Assessment (SA) with appropriate examples.	12	1	2	
3.B	Explain what is meant by 'Principles of Equity and Common but Differentiated Responsibilities and Respective Capabilities' required for sustainable development. (8)	08	1	2	7.1.1
4.A	'Sustainable development (SD) as a whole is Descriptive, while for discourse of SDG, the SD should be normative' Explain with an example.	08	2	2,3	7.1.3
4.B	Define 'Green Buildings' as per National Building Code (NBC). (3) State the elements of Green building. (3) Define 'Green building rating systems'. (2) State IGBC's Green building assessment Criteria and credits' for New Buildings. (4)	12	2	2,3	7.1.3
5.A	State the four principles of Sustainability. (2) Explain the importance and implementation of 'Meta principle of Sustainability'. (4) State the strong measures of sustainability. (2)	08	4	2	7.1.2
5.B	Explain how life cycle assessment of any project can help in decision making. Give appropriate example. (6) Explain how cost benefit analysis tool can be used for sustainability assessment of a project. Give appropriate example. (6)	12	4	2,3	7.1.2
6.A	State and explain the constitutional provisions for sustainable development in India. (8) State the socio-economic challenges in India, explain any one. (4)	12	1	1,2	7.1.1
6.B	Differentiate between 'Kyoto protocol' and 'Paris Agreement'. (4) Discuss the major outcomes of the UNCED - 1992 - Rio Conference or Earth Summit. (4)	08	2	2,3	7.1.1
7	Write detailed note on: (5 points each) 1. United Nations Development Assistance Framework (UNDAF) 2. United Nations Framework Convention on Climate Change (UNFCCC) 3. National Sustainable Development Strategies (NSDS) 4. Human Development Index (HDI) and Sustainable Development Index (SDI)	20	3	6	7.1.4



Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058



END SEM Examinations June 2023

Program: Civil/Mech/Elect Engineering

Duration: 3hr

Course Code: (OE-BTC 613 & OE-BTC 813)

Maximum Points: 100

Course Name: Watershed Development & Management

Semester: VI/VIII

Instructions:

T. Y. B. Tech (Civ. & M. E.)

1. Attempt any five questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

9/6/23

Q. No.		Questions	Points	CO	BL	PI
1	a	Describe the climatic and hydrologic characteristics associated with Watersheds.	8	CO1	BL2	1.4.1
	b	A watershed has following data as given below	5	CO1	BL3	1.4.1
		Determine the values of form factor, circulatory ratio, shape factor, compactness coefficient and elongation ratio of the watershed for the following details given below:				
		Area of watershed is 50 sq. km. Length of drainage basin is 10,000 m. Perimeter of basin is 25,000 m. Maximum basin length is 15,000 m.				
	c	Discuss the salient features of Integrated Watershed management programme.	7	CO1	BL1	1.4.1
2	a	Explain the interaction of surface water storage and groundwater storage when precipitation occurs in the Watershed.	7	CO1	BL2	1.4.1
	b	Describe the chronology of watershed development programme in India.	5	CO1	BL1	2.1.1
	c	Discuss in detail the engineering measures for soil conservation.	8	CO2	BL2	1.4.1
3	a	Define watershed management and discuss the need of watershed management in the context of present scenario.	6	CO1	BL2	1.3.1
	b	Explain in detail types of soil erosion in a watershed	9	CO2	BL2	2.1.1
	c	Brief about initiatives taken by National Highway authority of India for water conservation and groundwater recharge during highway construction.	5	CO1	BL2	2.1.1

4	a	Discuss in detail the classification of land capability.	8	CO1	BL2	1.3.1
	b	The size of the catchment area is about 1200 m <sup>2</sup>	7	CO1	BL4	1.4.1
	With an average annual rainfall of about 1570mm. Assume that only 50% of the rainwater is stored (due to losses). Estimate the quantity of water which is available for recharge. Assuming that the requirement of water for domestic purpose is 15 lits/capita/day for the family of 7 members. Determine the requirement of water for which can be stored in tank/recharged.					
	c	Classify bench terraces as per slope and also draw neat labelled diagram.	5	CO1	BL1	1.3.1
5	a	Describe how watershed management programme helped the people of Hiware Bazar village.	6	CO1	BL1	2.1.2
	b	Discuss the guidelines for preventing water and wind erosion in a watershed.	7	CO1	BL2	2.3.2
	c	Discuss the purpose of Artificial recharge and list the different techniques of artificial recharge.	7	CO1	BL1	1.3.1
6	a	Classify and discuss check dams.	8	CO1	BL2	2.1.2
	b	Define grassed waterway and write its function in the soil conservation.	6	CO1	BL2	1.3.1
	c	You have been assigned as a responsibility for the development of a particular watershed, discuss about the data required for the watershed development project based on the household basis.	6	CO2	BL2	1.3.1
7	a	Discuss the roles and responsibilities of the Watershed Development Team(WDT)	8	CO2	BL2	3.1.2
	b	Brief about the criteria for selection of watershed projects.	5	CO1	BL1	2.3.2
	c	Discuss the classification of watershed on the basis of land use.	7	CO1	BL2	1.3.1





Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAM**

**JUNE 2023**

**Program: CIVIL ENGINEERING**

**Duration: 3hrs**

**Course Code: MC 102**

**Maximum Points: 100**

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

**NOTE:**

**1. Q.1 is compulsory & solve any four out of remaining six questions**

T. Y. B. Tech (Civil engg), (Sem - VI).

Q.No.	Questions	Points	CO	BL	Module No.
1	Write a short note on(Any four) 1) Hydrological cycle 2) Need for forest conservation 3) Flow sheet of water treatment plant 4) Renewable Vs. Non renewable energy sources 5) Environmental Impact Assessment 6) Green Building	20	1-3	BLI	1-5
2	A. Discuss the causes, effects and measures to counter global warming. B. Define: Biodiversity. Explain the values of biodiversity and threats to biodiversity. C. Define: Soil pollution. Explain its sources, effects and mitigation measures for soil pollution.	6+8+6	1,2	BLI	1,2,3
3	A. Define: Solid waste management . Explain the various types and disposal techniques of solid waste in detail. B. Discuss the relationship of human beings with their environment and how human activity is responsible for environmental degradation. C. Explain the main provisions of Environmental Protection Act 1986.	6+6+8	1-3	BLI BLII	2,5
4	A. Discuss the Water Pollution on following points, 1. Definition as per water (Prevention and control) pollution act, 1974. 2. Point and non point sources 3. Effect on environment 4. Control measures B. Discuss the air pollution on following points, 1. Definition as per Air (Prevention and control) pollution act, 1981. 2. Primary and secondary pollutants of air pollution 3. Effect on environment	20	1-3	BLII BLI	3



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

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



**END SEMESTER EXAM**

**JUNE 2023**

	4. Control measures				
5	A. Define: Ecosystem and its importance. Explain any two types of terrestrial and aquatic ecosystems with examples. B. Discuss the Noise Pollution on following points, a. Definition of sound and noise pollution b. Source's of noise pollution c. Noise standards for ambient noise levels d. Effect on environment e. Control measures	20	1-3	BLII	2
6	A. Define: Biome, GPP, NPP, food chain, food web, trophic levels B. Draw a treatment flow sheet for sewage treatment plant and explain the functions of every unit. C. Write a short note on: Ozone layer depletion and green house gas effect.	6+8+6	1-3	BLI BLII	2,4
7	A. Write a short note on: Plastic waste management rules 2016. B. Write a short note on: Electronic waste management rules 2016.	20	1-3	BLI	5