



**Department of Civil Engineering**

**LESSON PLAN**

**Session: JAN – JUNE, 2026**

**Semester: 6<sup>th</sup>**

**Name:** \_\_\_\_\_

**University Roll Number:** \_\_\_\_\_

**BUDDHA INSTITUTE OF TECHNOLOGY**

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CL-1 Sector - 7, GIDA, Gorakhpur - 273209 (U.P)

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## Evaluation scheme

**Subject 1- Design of Concrete Structures**

**Subject 2- Transportation Engineering**

**Subject 3- Environmental Engineering**

**Subject 4- Foundation Design**

**Subject 5- GIS & Remote**

**Subject 6- Constitution of India**

**HEC**

**CSEP**

**PPC**

**Lab 1 - Structural Detailing Lab**

**Lab 2 - Transportation Engineering Lab**

**Lab 3 - Environmental Engineering Lab**

## TIME TABLE

### BUDDHA INSTITUTE OF TECHNOLOGY, GIDA, GORAKHPUR CLASS TIME TABLE (Odd Sem 2025-26)

BUDDHA INSTITUTE OF TECHNOLOGY, GIDA, GORAKHPUR CLASS TIME TABLE (Odd Sem 2025-26)										
Dept. CE		w.e.f.: 11 Aug. 2025-26			Semester: 5 (A1+A2)		ROOM NO: 204-B			
Day / Time	09:10 AM to 10:05 AM	10:05 AM to 11:00 AM	SHORT BREAK (15 Min.)	11:15 AM to 12:10 PM	12:10 PM to 01:05 PM	LUNCH BREAK (40 Min.)	01:45 PM to 02:40 PM	02:40 PM to 3:35 PM	3:35 PM to 4:30 PM	
Monday	SA (RS)	ANPC (PK)		Geotech (A1)-CLC (BN)			Geotech (BN)		QECM (AK)	CT (VKS)
				QECM (A2)-(AK)						
Tuesday	HEC	Geotech (BN)		SA (RS)	ANPC (PK)		ITCS (RKT)	QECM (AK)	CT (VKS)	
Wednesday	PPC (ENG) (SKT)	SA (RS)		Geotech (A2)-CLC (BN)			ANPC (PK)		CT (VKS)	QECM (AK)
				QECM (A1)-(AK)						
Thursday	SA (RS)	CSEP (RS)		CT (VKS)	QECM (AK)		ANPC (PK)	Geotech (BN)	LIBRARY	
Friday	Geotech (BN)	SA (RS)		CAD LAB (A2)-R.N.306 (PK)			CT (VKS)		QECM (AK)	ANPC (PK)
			MINI PROJECT (A1)-CLC (RS)							
Saturday	CAD LAB (A1)-R.N. 306		SHORT BREAK (15 Min.)	Geotech (BN)	SA (RS)	LUNCH BREAK (40 Min.)				
	MINI PROJECT (A2)-CLC (RS)									

	Subject Code	Subject Name	Faculty Name	Lecture/Week
<b>Academics</b>	BCE501	Geotechnical ngineering	Baijnath Nishad	5
	BCE502	Structural Analysis	Rajan Shukla	6
	BCE503	Quantity Estimation and Construction Management	Ankur Kumar	5
	BCE051	Concrete Technology	Vijay Kumar Srivastav	5
	BCE057	Air and Noise Pollution Control	Pratish Kannujiya	5
	BNC502	Indian Tradition, Culture and Society (ITCS)	Rakesh Kumar Tiwari	1
	BCE551	CAD Lab	Pratish Kannujiya	2
	BCE552	Geotechnical Engineering Lab	Baijnath Nishad	2
	BCE553	Quantity Estimation and Management Lab	Ankur Kumar	2
	BCE554	Mini Project	Rajan Shukla	2
<b>Skill Development</b>		HEC		1
		CSEP	Rajan Shukla	1
		PPC	Santosh Kumar Tripathi	1
<b>Placement</b>				
<b>Self-Learning</b>		LIBRARY		1
			<b>Total</b>	<b>39</b>

**Mr. Baijnath Nishad**  
**HOD-CE**

## EVALUATION SCHEME

Subject Code	Subject	Sessional Marks	Exam Marks	Total Marks
<b>THEORY SUBJECTS</b>				
BCE601	Design of Concrete Structures	30	70	100
BCE602	Transportation Engineering	30	70	100
BCE603	Environmental Engineering	30	70	100
BCE064	Foundation Design	30	70	100
BOE066	GIS & Remote	30	70	100
BNC60	Constitution of India	30	70	100
<b>PRACTICAL/DESIGN/DRAWING</b>				
BCE651	Structural Detailing Lab	50	50	100
BCE652	Transportation Engineering Lab	50	50	100
BCE653	Enviromental Engineering Lab	50	50	100



# BUDDHA INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2025-26 (EVEN Semester)

## LESSON PLAN

Semester: VI	Section: A	Course Code: BCE 602	Contact Hours /week: 6
Course name: Transportation Engineering			# of credits: 3
Teacher's name: <b>Mr. PRATISH KANNAUJIYA</b>			Designation: AP
Sessional Marks: 30		End Semester Examination Marks:70	University Exam Hours: 3

Prerequisites if any:

NA

Content delivery methods:

By Face to face delivery, Presentation, Tutorial etc.

## COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	Introduction: Role of Transportation, Modes of Transportation History of road development, Road types and pattern, Nagpur road plan, Bombay road plan & 3rd 20 Year Road Plan, Highway Alignment & Location Survey: Horizontal Profile, Vertical Profile, Factors Controlling the alignment, Survey for route location,	8	1
2	Geometric Design(IRC:73-Latest revision): Cross sectional elements, camber, shoulder, sight distance, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves, summit and valley curves.	8	2

3	Traffic Engineering: Traffic Characteristics, Traffic studies on flow, speed, travel time - delay and O-D study, PCU, peak hour factor, accident study , traffic capacity, density, traffic control devices: signs, Island, signal design by Webster's and IRC method . Intersection at grade and grade separated intersections, design of roundabouts as per IRC:65-2017.Highway capacity and level of service of rural highways and urban roads as per latest IRC recommendation	8	3
4	Highway Materials: Properties of Sub grade, Aggregates & Binding materials, Various tests and specifications, Design of Highway Pavement : Types of Pavements, Design factors, Design of bituminous paving mixes; Design of Flexible Pavement by CBR method (IRC : 37- Latest revision), Design of rigid pavement, Westergaard theory, load and temperature stresses, joints, IRC method of rigid pavement design (IRC:58-2015)	8	4
5	Highway Construction: Construction of Sub grade, Water Bound Macadam (WBM), Wet mix macadam (WMM), Granular Sub Base (GSB),Tack Coat, Prime Coat, Seal Coat, Surface Dressing, Bituminous Macadam (BM), Semi dense bituminous concrete (SDBC) and Bituminous concrete, Dry lean concrete (DLC), Cement Concrete (CC) road construction, Roller Compacted Concrete Roads.	8	5

**COURSE OUTCOMES:** At the end of the Course, the Student will be able to:

<b>C01</b>	Understand the history of road development , their alignment & Survey.
<b>C02</b>	Design the various geometric parameters of road.
<b>C03</b>	Study the traffic characteristics & design of road intersections & signals.
<b>C04</b>	Examine the properties of highway materials & their implementation in design of pavements.
<b>C05</b>	Learn methods to construct various types of roads.

**Mapping of CO v/s PO:**

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
<b>C01</b>	1	1	1	1	-	-	-	-	-	-	-	-
<b>C02</b>	2	1	-	1	-	-	-	-	-	-	-	-
<b>C03</b>	-	1	-	-	-	-	-	-	-	-	-	-
<b>C04</b>	1	-	-	1	-	-	-	-	-	-	-	-
<b>C05</b>	1	-	-	2	-	-	-	-	-	-	-	-
<b>Average</b>	1	0.6	0.2	1	-	-	-	-	-	-	-	-
					PS01	PS02	PS03					
				<b>C01</b>	2	1	1					

<b>C02</b>	2	1	1
<b>C03</b>	2	1	1
<b>C04</b>	2	1	1
<b>C05</b>	2	1	1
<b>Average</b>	2	1	1

Correlation levels: 1-Slight (Low)    2-Moderate (Medium)    3-Substantial (High)

<b>Gap in the syllabus</b>	The syllabus lacks topics on sustainable road design, Intelligent Transportation Systems (ITS), climate resilience, advanced traffic modeling, road safety audits, and the use of recycled materials in pavements, which are crucial for modern infrastructure.
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<b>Topics to be covered beyond syllabus</b>	Beyond the syllabus, topics should include Intelligent Transportation Systems (ITS), sustainable road design, climate resilience, road safety audits, advanced traffic modelling, autonomous vehicle integration, and the use of recycled materials in pavements.
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### LESSON PLAN

Lecture	Module	Scheduled			Conducted			
		Topic	*RBT Levels	C O Mapping	Date	Topic	Date	No. Of Students
1	I	Introduction of Transportation Engineering	L2	CO 1				
2		Introduction : Role of Transportation	L2					
3		NHAI Act (1988)	L2					

4	Highway Alignment and location survey	L2					
5	Road Development Plan Vision: 2021 documents	L2					
6	Modes of Transportation						
7	Nagpur Road plan						
8	<b>Tutorial-1</b>	L2					
9	Bombay Road Plan & Lucknow Road plan	L2					
10	Bombay Road Plan & Lucknow Road plan						
11	Road types and pattern						
12	Road types and pattern						
13	Survey for Route Location	L2					
14	Highway Alignment & Location Survey						
15	Highway Alignment & Location Survey						
16	Horizontal Profile & Vertical Profile	L2					
17	Factors Controlling the alignment,	L2					
18	<b>Tutorial-2</b>	L2					
19	Introduction to Geometric Design(IRC:73-	L3					

	II	Latest revision)		CO 2						
20		Introduction to Geometric Design(IRC:73- Latest revision)								
21		Geometric Design	L2							
22		Cross sectional elements								
23		<b>Tutorial-3</b>								
24		Camber, Shoulder	L2							
25		Sight distance, Horizontal curves	L2							
26		Super elevation, Extra widening	L2							
27		Transition curves and gradient	L3							
28		Vertical curves								
29		Summit and Valley curves	L3							
30		<b>Tutorial-4</b>	L3							
31			Introduction of Traffic Engineering		L3					
32	Traffic Engineering & Characteristics		L2							
33	Traffic studies on flow, speed		L3							
34	Traffic volume and speed study									

35	II I	Travel time - delay and O-D study, PCU	L2	CO 3				
36		Travel time - delay and O-D study, PCU						
37		Peak hour factor, Parking study	L3					
38		<b>Tutorial-5</b>						
39		Accident Study and Analysis	L3					
40		Traffic capacity, Traffic density, Traffic control devices	L3					
41		Traffic Signs, Island						
42		Signal design by Webster's and IRC method	L3					
43		Intersection at grade and grade separated intersections,						
44		Design of roundabouts as per IRC: 65-2017.						
45		Highway capacity and level of service of rural highways and urban roads as per latest IRC recommendation	L2					
46		Highway capacity and level of service of rural highways and urban roads as per latest IRC recommendation						
47		<b>Tutorial-6</b>	L2					
48	IV	Introduction to Highway Materials	L2	CO 4				

49	Properties of Sub grade , Aggregates & Binding materials	L2					
50	Properties of Sub grade , Aggregates & Binding materials						
51	Various tests and specifications						
52	Various tests and specifications						
53	Design of Highway Pavement	L2					
54	Types of Pavements, Design factors	L2					
55	<b>Tutorial-7</b>	L3					
56	Design of bituminous paving mixes	L3					
57	Design of Flexible Pavement by CBR method (IRC : 37- Latest revision)	L3					
58	Design of rigid pavement,						
59	Westergaard theory, Load and temperature stresses, joints	L3					
60	Westergaard theory, Load and temperature stresses, joints						
61	IRC method of rigid pavement design (IRC:58-2015)	L2					
62	<b>Tutorial-8</b>	L3					

63	V	Introduction to Highway Construction	L2	CO 5				
64		Construction of Sub grade	L2					
65		Water Bound Macadam (WBM)	L3					
66		Wet mix macadam (WMM)	L3					
67		Granular Sub Base (GSB)	L2					
68		Tack Coat, Prime Coat, Seal Coat,	L3					
69		<b>Tutorial-9</b>	L3					
70		Surface Dressing , Bituminous Macadam (BM), Semi dense bituminous concrete (SDBC)	L3					
71		Surface Dressing , Bituminous Macadam (BM), Semi dense bituminous concrete (SDBC)						
72		Bituminous concrete, Dry lean concrete (DLC),	L3					
73		Bituminous concrete, Dry lean concrete (DLC),						
74		Cement Concrete (CC) road construction	L3					
75	Roller Compacted Concrete Roads	L3						

76		<b>Tutorial-10</b>	L2					
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<b>Class Test</b>	<b>Syllabus</b>
<b>CT-01</b>	<b>Class 1-Class 29</b>
<b>CT-02</b>	<b>Class 30-Class 60</b>
<b>PRE-AKTU</b>	<b>Full Syllabus</b>

**\*Revised Bloom's Taxonomy (RBT) Levels:**

L1 - Remembering; L2 - Understanding; L3 - Applying; L4 - Analysing; L5 - Evaluating; L6 - Creating

**Text Books**

1. Highway Engineering by S. K. Khanna and C.E.G. Justo, New Chand & brothers, Roorkee.
2. Traffic Engineering by L. R. Kadiyali, Khanna Publishers, New Delhi .
3. Principles of Transportation and Highway Engineering by G.V. Rao, Tata McGraw Hill, New Delhi.
4. Highway and Traffic Engineering by Subhash C. Saxena, CSB Publishers and Distributers Ltd.

**Reference Book**

5. Transportation Engineering by James S. Banks Tata McGraw Hill, New Delhi.
6. Transportation Engg. by Papakosta and P.D. Prevedouros , Prentice Hall India, New Delhi.
7. Highway Material Testing S.K. Khanna and C.E.G. Justo.
8. Highway Material Testing by A.K. Duggal.

**Faculty Sign**

**HOD's sign**



# BUDDHA INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2025-26 (EVEN Semester)

## LESSON PLAN

Semester: VI	Section: A1+A2	Course Code: BCE-603	Contact Hours /week: 6
Course name: : <b>Environmental Engineering</b>			# of credits: 3
Teacher's name: <b>Mr. Rajan Shukla</b>			Designation: A.P
Sessional Marks: 30		End Semester Examination Marks:70	University Exam Hours: 3

Prerequisites if any:
NA

Content delivery methods:	By Face to face delivery, Tutorial, books etc.
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### COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	<b>UNIT I - Introduction to Water Supply Systems</b> Freshwater resources, water demand assessment, factors affecting consumption, Population forecasting methods, Design period, variation in demand, Transmission of water: Types of conduits, economical sizes, structural requirements, Laying, testing, and leakage control in water supply pipelines.	15	CO1
2	<b>UNIT II - Water Storage and Distribution Systems</b> Storage methods, service reservoirs, balancing reservoirs, Design and layout of water distribution systems (gravity, pumping, and combined systems), General guidelines for the design of distribution networks, Use of SCADA/Water GEM/Open Source Free Software in water distribution monitoring, Study of GIS based water distribution analysis,	15	CO2

	important aspect of Smart City.		
3	<b>Unit III - Water Quality Assessment</b> Physical, chemical, and bacteriological examination of water and wastewater, Key parameters: pH, turbidity, BOD, COD, TDS, heavy metals, nutrients Water quality standards (IS 10500, WHO guidelines), Impact of wastewater disposal on land and water bodies.	15	CO3
4	<b>Unit IV - Water Treatment Processes</b> Objectives of water treatment: Unit operations and flow diagrams, Sedimentation, coagulation, filtration, and disinfection, Design of sedimentation tanks, grit chambers, and filters, Disinfection techniques (chlorination, ozonation, UV), Advanced treatment: Membrane filtration, ion exchange, and desalination techniques	16	CO4
5	<b>UNIT V - Wastewater Treatment and Emerging Technologies</b> Primary, secondary, and tertiary treatment processes Activated sludge process, trickling filters, anaerobic digesters, Design of septic tanks and UASB reactors, Emerging technologies: MBR, MBBR, constructed wetlands, and AOPs, Basics of Environmental Impact Assessment (EIA) for water projects	15	CO5

**COURSE OUTCOMES:** At the end of the Course, the Student will be able to:

<b>CO1</b>	Assess water demand and optimal size of water mains
<b>CO2</b>	Layout the distribution system & assess the capacity of reservoir
<b>CO3</b>	Investigate physical, chemical & biological parameter of water.
<b>CO4</b>	Design treatment units for water and waste water.
<b>CO5</b>	Apply emerging technologies for treatment of waste water.

**Mapping of CO v/s PO:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	2	1	2	-	-	1	-	-	-	-	-	1
<b>CO2</b>	2	2	2	-	-	1	-	-	-	-	-	1
<b>CO3</b>	1	3	2	1	-	-	-	-	-	-	-	1
<b>CO4</b>	2	3	2	2	-	1	-	-	-	-	-	1

<b>CO5</b>	2	3	2	2	-	1	-	-	-	-	-	1
<b>Average</b>	1.8	2.4	2	1	-	0.8	-	-	-	-	-	1

	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	2	1	2
<b>CO2</b>	2	2	2
<b>CO3</b>	1	3	2
<b>CO4</b>	2	3	2
<b>CO5</b>	2	3	2
<b>Average</b>	1.8	2.4	2

Correlation levels: 1-Slight (Low)      2-Moderate (Medium)      3-Substantial (High)

<b>Gap in the syllabus</b>	N.A.
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<b>Topics to be covered beyond syllabus</b>	N.A.
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## LESSON PLAN

Lecture	Module	Scheduled				Conducted			
		Topic	*RBT Levels	CO Mapping	Date	Topic	Date	No. Of Students	Faculty Sign
1	I	Freshwater resources, water demand assessment, factors affecting consumption	L2	CO1					
2		Freshwater resources, water demand assessment, factors affecting consumption	L2						
3		Freshwater resources, water demand assessment, factors affecting consumption	L2						
4		Population forecasting methods	L2						
5		Population forecasting methods	L2						
6		Population forecasting methods	L2						
7		Design period, variation in demand							
8		Design period, variation in demand	L2						

9		<b>Tutorial 1</b>	L2					
10		Design period, variation in demand	L2					
11		Transmission of water: Types of conduits, economical sizes, structural requirements	L2					
12		Transmission of water: Types of conduits, economical sizes, structural requirements	L2					
13		Transmission of water: Types of conduits, economical sizes, structural requirements	L2					
14		Laying, testing, and leakage control in water supply pipelines	L2					
15		Laying, testing, and leakage control in water supply pipelines	L2					
16		Laying, testing, and leakage control in water supply pipelines	L2					
17		<b>Tutorial 2</b>	L2					
18		Storage methods, service reservoirs, balancing reservoirs	L2					
19	II	Storage methods, service reservoirs, balancing reservoirs	L2					
20		Storage methods, service reservoirs, balancing reservoirs	L2					
21		Design and layout of water distribution systems (gravity, pumping, and combined systems)	L2	CO2				
22		Design and layout of water distribution systems (gravity, pumping, and combined systems)	L2					
23		Design and layout of water distribution systems (gravity, pumping, and combined systems)	L2					

24	General guidelines for the design of distribution networks	L2					
25	General guidelines for the design of distribution networks	L2					
26	<b>Tutorial 3</b>	L2					
27	General guidelines for the design of distribution networks	L2					
28	Use of SCADA/Water GEM/Open Source Free Software	L2					
29	Use of SCADA/Water GEM/Open Source Free Software in water distribution monitoring	L2					
30	Use of SCADA/Water GEM/Open Source Free Software in water distribution monitoring	L2					
31	Study of GIS based water distribution analysis, important aspect of Smart City.	L2					
32	Study of GIS based water distribution analysis, important aspect of Smart City.	L2					
33	Study of GIS based water distribution analysis, important aspect of Smart City.	L2					
34	<b>Tutorial 4</b>	L2					
35	Physical, chemical, and bacteriological examination of water and wastewater	L2					
36	Physical, chemical, and bacteriological examination of water and wastewater	L2					
37	Physical, chemical, and bacteriological examination of water and wastewater	L2					
38	Key parameters: pH, turbidity, BOD, COD, TDS, heavy metals, nutrients	L2					

39		Key parameters: pH, turbidity, BOD, COD, TDS, heavy metals, nutrients	L2	CO5					
40		Key parameters: pH, turbidity, BOD, COD, TDS, heavy metals, nutrients	L2						
41		<b>Tutorial 5</b>	L2						
42		Water quality standards (IS 10500, WHO guidelines)	L2						
43	V	Water quality standards (IS 10500, WHO guidelines)	L2						
44		Water quality standards (IS 10500, WHO guidelines)							
45		Impact of wastewater disposal on land and water bodies	L2						
46		Impact of wastewater disposal on land and water bodies	L2						
47		Impact of wastewater disposal on land and water bodies	L2						
48		<b>Tutorial 6</b>	L2						
49		Objectives of water treatment: Unit operations and flow diagrams	L2						
50		Objectives of water treatment: Unit operations and flow diagrams	L2						
51		Objectives of water treatment: Unit operations and flow diagrams	L2						
52		Sedimentation, coagulation, filtration, and disinfection	L2						
53		Sedimentation, coagulation, filtration, and disinfection	L2						
54		Sedimentation, coagulation, filtration, and disinfection	L2						

55		Design of sedimentation tanks, grit chambers, and filters	L2						
56		Design of sedimentation tanks, grit chambers, and filters	L2						
57		<b>Tutorial 7</b>	L2						
58		Design of sedimentation tanks, grit chambers, and filters	L2						
59		Disinfection techniques (chlorination, ozonation, UV)	L2						
60		Disinfection techniques (chlorination, ozonation, UV)	L2						
61		Disinfection techniques (chlorination, ozonation, UV)	L2						
62		Advanced treatment: Membrane filtration, ion exchange, and desalination techniques	L2						
63		Advanced treatment: Membrane filtration, ion exchange, and desalination techniques	L2						
64		Advanced treatment: Membrane filtration, ion exchange, and desalination techniques	L2						
65		<b>Tutorial 8</b>	L2						
66		Primary, secondary, and tertiary treatment processes	L2						
67		Primary, secondary, and tertiary treatment processes	L2						
68		Primary, secondary, and tertiary treatment processes	L2						
69		Activated sludge process, trickling filters, anaerobic digesters	L2						
70		Activated sludge process, trickling filters, anaerobic digesters	L2						

71	Activated sludge process, trickling filters, anaerobic digesters	L2						
72	Design of septic tanks and UASB reactors	L2						
73	Design of septic tanks and UASB reactors	L2						
74	<b>Tutorial 9</b>	L2						
75	Design of septic tanks and UASB reactors	L2						
76	Emerging technologies: MBR, MBBR, constructed wetlands, and AOPs	L2						
77	Emerging technologies: MBR, MBBR, constructed wetlands, and AOPs	L2						
78	Emerging technologies: MBR, MBBR, constructed wetlands, and AOPs	L2						
79	Basics of Environmental Impact Assessment (EIA) for water projects	L2						
80	Basics of Environmental Impact Assessment (EIA) for water projects	L2						
81	Basics of Environmental Impact Assessment (EIA) for water projects	L2						
82	<b>Tutorial 10</b>	L2						

<b>Class Test</b>	<b>Syllabus</b>
<b>CT-01</b>	<b>Class 1-Class 25</b>
<b>CT-02</b>	<b>Class 25-Class 64</b>

**Literature:****Text Books: (As prescribed by University)**

**T1.**S.K.Garg: Water Supply Engineering (Environmental Engineering Vol. – I)

**T2.**S.K.Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. II).

**Reference Books: (As prescribed by University)**

**R1.**Manual on Water Supply and Treatment, C. P. H. E. E. O.,Ministry of Urban Development,  
Government of India, New Delhi

**R2.**Steel and McGhee: Water Supply and Sewerage

**R3.**Hammer and Hammer Jr.: Water and Wastewater Technology

**Faculty Sign****HOD's sign**



# BUDDHA INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2025-26 (EVEN Semester)

## LESSON PLAN

Semester: VI	Section: A	Course Code: BCE 064	Contact Hours /week: 5
Course name: FOUNDATION DESIGN			# of credits: 3
Teacher's name: <b>Mr. BAIJNATH NISHAD</b>			Designation: AP
Sessional Marks:30	End Semester Examination Marks:70		University Exam Hours: 3

### Prerequisites if any:

Subject Code	Subject Name	Description	Semester
BCE 501	GEOTECHNICAL ENGINEERING	Index properties of soils and basic relations	5

Content delivery methods:	By Face to face delivery, Presentation, Tutorial etc.
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### COURSE SYLLABUS (as prescribed by University / Board)

Module No	UNIT Contents	Hours	COs
1	Introduction to soil exploration, methods of boring and drilling, soil sampling and sampler, insitu tests, SPT, CPT, DCPT, geophysical methods; soil resistivity methods seismic refraction Methods.	16	CO1
2	Bearing capacity of shallow foundation, design criteria, factors affecting bearing capacity, factors influencing selection of depth of foundation, modes of shear failures, types of shallow foundations, contact pressure under rigid and flexible footings, Terzaghi's, Meyerhof, Hansen's bearing capacity theories, IS code method Settlement of shallow foundations: components of settlement & its estimation, immediate, consolidation, & differential settlements.	16	CO2

3	Design of shallow foundation; principles of design of footing, design of isolated footings and strip footing. Deep foundation; introduction, necessity of deep foundations, pile installation, pile groups, groupaction of piles in sand and clay, group efficiency of piles, settlement of piles, negative skin friction, single and double under reamed piles.	14	C03
4	Introduction shapes and characteristics of wells, components of well foundation, forces acting on well foundation, sinking of wells, causes and remedies of tilts and shifts. Retaining walls: introduction, types of retaining structures, support systems for flexible retaining walls (struts, anchoring), construction methods, introduction and uses of sheet piles.	11	C04
5	Geotechnical properties of reinforced soil, use of soil reinforcement, shallow foundation on soil with reinforcement, design considerations, idealized soil, and foundation and interface behaviour, elastic models of soil behaviour.	19	C05

**COURSE OUTCOMES:** At the end of the Course, the Student will be able to:

<b>C01</b>	Classify The various methods of Soil Exploration, samplers and foundations etc.
<b>C02</b>	Apply the concepts of bearing capacity and settlement of soil for shallow foundation.
<b>C03</b>	Analyze bearing capacity and settlement of soil for deep foundation.
<b>C04</b>	Understand the characteristics of well foundations and retaining wall.
<b>C05</b>	Understand the concept of soil reinforcement.

**Mapping of CO v/s PO:**

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
<b>C01</b>	1	1	1	1	1	1	1	-	1	1	1	1
<b>C02</b>	1	1	1	2	1	-	-	-	1	1	1	1
<b>C03</b>	2	2	1	2	1	-	-	-	-	-	1	1
<b>C04</b>	2	1	1	1	1	1	-	-	-	-	1	1
<b>C05</b>	1	1	1	1	-	-	-	-	-	-	-	-
<b>Average</b>	1.4	1.2	1	1.4	1	1	1	-	1	1	1	1

	PS01	PS02	PS03
<b>C01</b>	2	1	1
<b>C02</b>	2	1	1
<b>C03</b>	2	1	1

<b>C04</b>	2	1	1
<b>C05</b>	2	1	1
<b>Average</b>	2	1	1

Correlation levels: 1-Slight (Low)

2-Moderate (Medium)

3-Substantial (High)

<b>Gap in the syllabus</b>	Topics related to Analysis of earthen dam, linked problems and topics which are directly solve as in social, health, cultural and future aspects.
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<b>Topics to be covered beyond syllabus</b>	Bridge topics which are help to solve different competitive Exam such as GATE,IES and State AE etc.
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### LESSON PLAN

Lecture	Module	Scheduled			Conducted			
		Topic	*RBT Levels	C O Mapping	Date	Topic	Date	No. Of Students
1		Introduction of Foundation and its engineering aspects	L2					
2		Application and advantages of foundation	L2					
3		Needs of foundation	L2					
4		Introduction of sub-soil	L2					
5		Introduction of soil exploration	L2					

6	<b>I</b>	Methods which are use for exploration of soil	L2	<b>CO1</b>					
7		Methods of boring for testing and to check strength of soil	L2						
8		Methods of drilling for testing and to check strength of soil	L2						
9		<b>TUTORIAL-1</b>	L2						
10		Soil sampling and Sampler application							
11		Introduction of geophysical methods: Soil resistivity methods	L2						
12		Introduction of seismic refraction	L2						
13		In situ tests SPT	L3						
14		Numerical based on sampler.	L3						
15		Numerical based on boring and exploration methods	L2						
16		<b>TUTORIAL-2</b>	L2						
17		<b>II</b>	Introduction of Foundation		L2	<b>CO2</b>			
18	Failure of foundations and its safety measures.		L2						
19	Types of loads combination and Gross and net pressure		L3						
20	Gross, net, safe and net safe bearing capacity.								
21	Different theories on foundation.		L2						
22	Bearing capacity of shallow foundation, design criteria		L2						
23	Factors affecting bearing capacity		L3						

24		Factors influencing selection of depth of foundation	L3					
25		<b>TUTORIAL-3</b>	L3					
26		Modes of shear failures for study of bearing capacity and Types of shallow foundations	L2					
27		Contact pressure under rigid footings and Contact pressure under flexible footings	L2					
28		Terzaghi's , Meyerhoff bearing capacity theories	L2					
29		IS code method bearing capacity theories and Settlement of shallow foundations	L2					
30		Introduction of immediate, consolidation, & differential settlements						
31		Introduction of differential settlements Hansen's bearing capacity theories	L2					
32		<b>TUTORIAL-4</b>	L2					
33		Design of shallow foundation and Principles of Design of shallow foundation.	L3					
34		Water table effects on bearing capacity footing	L3					
35		Numerical based on water table effects on	L3					
36		Introduction and design of isolated footings and strip footing	L3					
37		Deep foundation; introduction and Necessity of deep foundations.	L3					
38		<b>TUTORIAL-5</b>	L2					
39	<b>II</b>	Types of deep foundation.	L3	<b>CO</b> 3				
40	<b>I</b>	Pile installation, pile groups.	L3					

41		Group action of piles in sand and clay.						
42		Numerical based on plate load test	L2					
43		Group efficiency of piles and settlement of group pile	L2					
44		Negative skin friction and its application	L2					
45		Single and double under reamed piles	L2					
46		<b>TUTORIAL-6</b>	L2					
47		Introduction and different shapes of foundation.	L2					
48		Characteristics of wells foundation.	L3					
49		Grip length and rectifying method						
50		Sinking of well foundation Causes and remedies of tilts.	L3					
51		<b>TUTORIAL-7</b>	L3					
52		Shifts and Retaining walls.	L2					
53		Introduction, types of retaining structures.	L2					
54		Support systems for flexible retaining walls (struts & anchoring)	L3					
55		Introduction of sheet piles and Uses of sheet piles.	L3	<b>C04</b>				
56		Construction methods.	L2					
57		Numerical based on sheet piles	L2					
58	<b>IV</b>	<b>TUTORIAL-8</b>						
59	<b>V</b>	Geotechnical properties of reinforced soil	L2					

60	Use of soil reinforcement	L2	CO5					
61	Stabilization of soil	L2						
62	Geosynthetic materials	L2						
63	Types of geosynthetic material							
64	Forms of reinforcing material	L2						
65	Criteria of design reinforcing	L3						
66	Shallow foundation on soil with reinforcement	L3						
67	<b>TUTORIAL-9</b>	L3						
68	Idealized soil and based theories for analysis							
69	Foundation and interface behaviour	L2						
70	Different mechanism for analysis	L3						
71	Elastic models of soil behavior.	L2						
72	Settlement of foundation	L2						
73	Permissible settlement	L2						
74	Correction in settlement	L2						
75	Bar scheduling in foundation	L2						
76	Contact pressure							
77	Blending of soils	L3						
78	Effect on bearing capacity of soil	L2						
79	Failures of soils and its prevention	L2						
80	Retaining wall and components	L2						
81	Active and passive earth pressure	L2						
82	<b>TUTORIAL-10</b>							

<b>Class Test</b>	<b>Syllabus</b>
<b>CT-01</b>	<b>Class 1-Class 23</b>
<b>CT-02</b>	<b>Class 24-Class 65</b>
<b>PRE-AKTU</b>	<b>Full Syllabus</b>

**\*Revised Bloom's Taxonomy (RBT) Levels:**

L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

**References:**

**Text books :( As per University / Board syllabus)**

**T1.** Gopal Ranjan and A.S.R. Rao – Basic and Applied Soil Mechanics.

**T2.** K.R. Arora – Soil Mechanics and Foundation Engineering.

**T3.** Narasinga Rao, B.N.D, “Soil Mechanics & Foundation Engineering”, John Wiley & Sons, Wiley India Pvt. Ltd., Daryaganj, New Delhi – 110 002.

**Reference Books:(As per University / Board syllabus)**

**R1.** V.N.S. Murthy – Soil Mechanics and Foundation Engineering (Fifth Edition).

**R2.** Principles of geotechnical engineering Braga M. Das, 2007.

**R3.** Foundation analysis and design (Hard cover). By Joseph E. Bowles.

**Faculty Sign**

**HOD's sign**