# **Darbhanga College of Engineering**



**Course File** 

of

## SOIL & ROCK MECHANICS (CEUG011615)

**Faculty Name:** 

Mr. Loknath Kumar

**Assistant Professor** 

**Department of Civil Engineering** 



विज्ञान एवं प्रावैधिकी विभाग Department of Science and Technology Government of Bihar

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## **Department of Civil Engineering**

### Darbhanga College of Engineering Darbhanga

#### **Vision of Department**

To bring forth competent engineers to serve national & multi-national industries and society and, encouraging them towards higher studies.

#### **Mission of Department**

- M1. To nurture graduates into competent and technologically capable professionals through motivated teaching-learning ambience and by collaborating with relevant industries.
- M2. To encourage graduates towards research and innovation in the field of civil engineering.

M3. To inculcate humanitarian ethical values in graduates through various socialcultural activities.

## **Program Educational Objectives (PEOs)**

**PEO1.** The graduates will be able to demonstrate knowledge and skills of civil engineering to solve engineering problems related to structural design.

**PEO2.** The graduates will be able to function in the evolving research and development as design consultant in the relevant industry using modern software tools.

**PEO3.** The graduates will be able to showcase professional skills encompassing societal and ethical values.

## **Program Outcomes (POs):**

PO1	<b>Engineering knowledge</b> : An ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to get the solution of the engineering problems.
PO2	<b>Problem analysis:</b> Ability to Identify, formulates, review research literature, and analyze complex engineering problems.
PO3	<b>Design/development of solutions:</b> Ability to design solutions for complex engineering problems by considering social, economical and environmental aspects.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge to design, conduct analyse experiments to get valid conclusion.
PO5	<b>Modern tool usage:</b> ability to create, select, and apply appropriate techniques, and to model complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Ability to apply knowledge by considering social health,

	safety, legal and cultural issues.
PO7	<b>Environment and sustainability:</b> Understanding of the impact of the adopted engineering solutions in social and environmental contexts.
PO8	<b>Ethics</b> : Understanding of the ethical issues of the civil engineering and applying ethical principles in engineering practices.
PO9	<b>Individual and teamwork:</b> Ability to work effectively as an individual or in team, as a member or as a leader.
PO10	<b>Communication:</b> An ability to communicate clearly and effectively through different modes of communication.
PO11	Project management and finance: Ability to handle project and to manage finance related issue
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

#### **Course Objectives**

The objective of this course is to study the detail of soil and rock mechanics. Soil mechanics portion deals with finding the shear strength, stability of slope and active and passive earth pressure of soil. The rock mechanics portion is about the basic rock mechanics along with subsurface investigation using geophysical methods. Moreover, introduction to tunneling is also discussed here.

#### Course Outcomes (Students will be able to)

- 1. Understand the shear strength parameters of soil.
- 2. Analyse earth pressure theories and effect on retaining wall.
- 3. Evaluate stability of slope of soil using analytical and graphical methods.
- 4. Understand engineering classification and engineering properties of rocks.
- 5. Design the tunnels for different engineering purposes.

### **CO-PO MAPPING**

Cos	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	PSO1	PSO2
CO1	1	2		2	2	1	1			1				3
CO2		3	2	2	2	2	2		2		2	2	1	2
CO3	1		2		1	2	1		1	2	3		1	2
CO4	2	1			2		1	2				2		2
CO5	1	2	3	3	3	2	2	3	1	3	2	2	3	3

#### Syllabus:

**1.Shear Strength of Soil :**Engineering use of shear strength, Direct and triaxial shear tests, Mohr-Coulomb strength criterion, drained, consolidated undrained and undrained tests, strength of loose and dense sands, NC and OC soils, dilation, pore pressure and Skempton's pore pressure coefficient. Lecture : 7

2.Earth pressure theories & Retaining Walls :Limit equilibrium method, effect of wall movement on earth pressure, pressure at rest, Rankine state of plastic equilibrium, Coulomb's theory, Rebhann and Culmann's graphical methods. Sheet piles –Types and uses of sheet piles, Analysis of Cantilever and anchored sheet piles in cohesionless and cohesive soil, Rowe's theory of moment reduction. Lecture: 5

**3.Stability of slopes :**Limit equilibrium methods, methods of slices, simplified Bishop's method and friction circle method, factors of safety, stability under conditions of submergence, drawdown and steady seepage, location of critical arc, stability number, chart.

#### Lecture:

**4.Engineering properties of rocks**: engineering classification of rocks, Surface and sub-surface investigation in rock including geophysical studies.

#### Lecture:7

**5.Weathering of rocks :**discontinuities, field and laboratory testing of rocks and rock masses, Stress-strain characteristics, Deformability of rocks, Friction and Shear strength, Slope stability, effect of water **Lecture : 8** 

6.Introduction to analysis and design of tunnels, blasting, bolting, tunneling techniques, application. Lecture : 6

#### Text Books :

1.A Text Book of Soil Mechanics and Foundation Engineering, Revised and enlarged 4thEdition 1993 by V.N.S. Murthy, Saikripa Technical Consultants, Bangalore.

2.Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R.Rao, Wiley Eastern Ltd., New Delhi.

3.Soil Mechanics and Foundation Engineering by K.R.Arora, Standard Pub. and Dist., Delhi., 1992.

4. Introduction to Rock Mechanics by R.E. Goodman, John Wiley and Sons, New York.

5. Rock Mechanics and Engineering by Jacger, Charles, Cambridge University Press, London.

#### Reference Books :

(1)Soil Mechanics in Engineering Practice by Terzaghi and Peck, John Wiley and Sons Inc. New York, 1967

(2)Soil Mechanics by Lamb and Whitman, Wiley Eastern Pvt. Ltd., New Delhi, 1969.

(3)Fundamentals of Soil Mechanics by Taylor, John Wiley and Sons Inc New York, 1948.

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3rd Year Civil Engineering				
S.N.	Registration No.	Student Name		
1	17101111001	ARUN KUMAR		
2	17101111002	PRADUMN KUMAR		
3	17101111003	KETAN SINHA		
4	17101111004	MD MATLUB NEYAZ		
5	17101111005	DEEPAK KUMAR		
6	17101111006	MANIKANT KUMAR		
7	17101111007	SURAJ KUMAR		
8	17101111008	AKASH RAMAN		
9	17101111009	SURENDRA KUMAR SAHU		
10	17101111010	ASHUTOSH KUMAR		
11	17101111011	NITISH KUMAR		
12	17101111012	BAUSKI KUMAR		
13	17101111013	SANJEEV KUMAR SINGH		
14	17101111014	SANDEEP KUMAR		
15	17101111015	SHUBHAM KUMAR		
16	17101111016	DEEPAK KUMAR		
17	17101111017	REKESH KUMAR MAHTO		
18	17101111018	UMA SHANKAR		
19	17101111020	AMIT KUMAR		
20	17101111021	RADHESH JHA SUMAN		
21	17101111022	ANISH ANAND		
22	17101111023	RAM BILASH YADAV		
23	17101111024	SACHIN KUMAR		
24	17101111025	ANSHU KUMAR		
25	17101111026	UDAY LAL DAS		
26	17101111028	CHANDAN KUMAR		
27	17101111029	SANJEET KR PRABHAKAR		
28	17101111030	NAVEEN KUMAR		
29	17101111031	RAKESH KUMAR		
30	17101111032	RANJEET KUMAR PATHAK		

1		
31	17101111033	MANISH KUMAR
32	17101111034	PRAVEEN KUMAR
33	17101111035	NAVIN KUMAR
34	17101111036	VISHAL KUMAR
35	17101111037	ISAAC ARYA
36	17101111038	VIKASH KUMAR
37	17101111039	MEERA KUMARI
38	17101111040	NEHAL RAJ
39	17101111041	SNEHLATA
40	17101111042	ASHISH KUMAR
41	17101111043	OM PRAKASH
42	17101111044	DARPAN KUMAR
43	17101111045	VIKASH KUMAR
44	17101111046	PRINCE KUMAR
45	17101111047	LALU KUMAR
46	17101111048	SANTOSH ANAND
47	17101111049	MD ESTEKHAR ALAM
48	17101111050	TARUN KUMAR
49	17101111052	MASOOM AKHTAR
50	17101111054	MUKUL KUMAR
51	17101111055	SHUBHAM RAJ
52	17101111056	KRISHNA ARYA
53	17101111057	PRATIK KUMAR
54	17101111058	AJIT KUMAR YADAV
55	17101111059	ABHISHEK RAJ
56	17101111060	RAHUL KUMAR
57	17101111061	VIKRAM KUMAR
58	17101111062	RAKESH KUMAR
59	17101111063	NIRANJAN KUMAR
60	17101111064	NITISH KUMAR
61	17101111065	MANISH KUMAR SINGH
62	17101111066	VIVEK MANI
63	18101111001	AMIT KUMAR
64	18101111901	SITA RAM YADAV
65	18101111902	RANVEER KUMAR YADAV

66	18101111903	NITISH KUMAR
67	18101111904	SONIKA NIRANJAN
68	18101111905	INDRA KUMAR
69	18101111906	SUMIT KUMAR
70	18101111908	NAVEEN KUMAR
71	18101111909	DEEPAK KUMAR

		5th Se	emester	w.e.f:	
DAY	Dept	. 09:00-11:00	11:00-01:00	01:00-02:0	02.02.2.2
	EEE	CS	PS-I	01.00-02.0	02:00-5:00
MONDA	Y CE	EE-1	MOM	-	V. PE Lab
	CSE	REMIDAL CLASSES	DBMS		V. HE LAB
	ME	HT	F M/C		IVIOUC
	EEE	V. CS Lab	ADC		Interaction
TUESDAY	CE	H & WRE	HE	1	M Goo Test Lat
	CSE	AI	DBMS		REMIDAL CLASSE
	ME	MP	V.REMIDAL LAB	-	ALIVIIDAL CLASSE
	EEE	PE	CS	1	V/ DS LLab
WEDNESDA	AY CE	ADCS	MOM	1	V. FS-ILdD
	CSE	SWE	AI		V. DRMS Lab
	ME	HT	EIKT	1	C C DIVIS LaD
	ELE	REMIDAL CLASSES	PS-I	LUNCH	V. CSIah
THURSDAY	CE	GEO TECH-1	TRE	1	V FE-1LAP
	CSE	V. DBMS Lab	SWE	1	V. LE-I LAB
	ME	KOM	V. REMIDAL LAB		Jennar
	EEE	V. PE Lab	PE		N/ ADC lab
FRIDAY	CE	COI	ADCS	1	GEO TECH I
	LSE	PS	FLAT		Interchin
	IVIE	MP	F M/C	1	intership
	ELL	Intership	Intership ADC R EE-1 TRE V		REMIDAL CLASSES
SATURDAY	CE	EE-1			V. H& W/RELAD
	LSE	PS	FLAT	FLAT	
	I ME	КОМ	V. REMIDAL LAB		WIC JUL
	EEE	(5th Sem)			
SN	Subject	Faculty		ME (5th Se	m)
1	PS-1	Mr. Tabish Shanu	SN.	Subject	Faculty
2	CS	Mr. Saniay Kumar	1	HT	Mr. Madhav Ram
3	PE	Mr. Abhishek Sharma	2	F M/C	Mr. Prabhakar Kumar
4	ADC	Dr Ravi Ranjan	3	MP	Mr. Rajat Gupta
5	Intership	All Faculty	4	KOM	Mr. Prashant Kr. Singh
6	MOOC	All Faculty	3	EIKT	Mr. Prashant Kr. Singh
	CE (	5th Sem)	0	MOOC	Mr. Vikash Kumar
SN.	Subject	Faculty	ex: 1	CSE (5th Ser	n)
1	MOM	Mr. Ravi Ranjan Kumar	SN.	Subject	Faculty
2	HE	Mr. Loknath Kumar	2	DBMS	Mr. Akhilesh Kumar
3	ADCS	Mr. S. S. Chhoudhary	2	SWE	Mr. Sunil Kumar Sahu
4	Geo Tech -I	Mr. Ahsan Rabbani	3	Al	Mr. Dhirendra Kumar
5	H & WRE	Mr. Prashant Kumar	4	FLAT	Mr. Ajit Kumar Gupta
6	EE-1	Mr. Jitendra Kumar	5	PS	
7	TE	Mr. Aditya Kumar	7	MOOC	Anand Kamal
8	COI	Mr. Loknath Kumar	0	Intership M	Mr. Sunil Kumar Sahu
19	Intership	All Faculty	0	MOOC N	Vir Anand Kamal
Torla	120				

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DCE Stanga

List of Students: Attached Lecture Notes: Attached Result: Awaited