# DARBHANGA COLLEGE OF ENGINEERING

DARBHANGA

COURSE FILE OF FOUNADATION ENGINEERING

(011722)



# MR. RAVI RANJAN KUMAR (Assistant Professor)

**DEPARTMENT OF CIVIL ENGINEERING** 

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		7	th Semester		w.e.f:
DAY	Dept.	09:00-11:00	11:00-01:00	01:00-02:00	02:00-5:00
	EEE	PPAS	Int. Ins.		Planning for GATE Classes
MONDAY	CE	DCS-II	TRE II		Planning for GATE Classes
	CSE	E III	Al		Planning for GATE Classes
	ME	RAC	OR		Planning for GATE Classes
	EEE	SGP	LCT		Planning for GATE Classes
THESDAY	CE	TRE II	FE		Planning for GATE Classe
TULSUAT	CSE	EII	DC		Planning for GATE Classe
	ME	OR	RAC		Planning for GATE Classe
	EEE	LCT	PPAS		Planning for GATE Classe
EDNESDAY	CE	TE (ELECTIVE-I)	DHS		Planning for GATE Classe
CEDINE SDAT	CSE	EI	EIII		Planning for GATE Classes
	ME	CAD/CAM	AM	LINCH	Planning for GATE Classe
	EEE	Int. Ins.	SGP	LUNCH	Planning for GATE Classe
THURSDAY	CE	EE -II	TE (ELECTIVE-I)		Planning for GATE Classe
INCRSDAT	CSE	DC	EIII		Planning for GATE Classes
	ME	ICE	CAD/CAM		Planning for GATE Classes
	EEE	✓ PPAS lab	V. Int. Ins. Lab		Planning for GATE Classes
LINIDAN	CE	DCS-II	EE-II		Planning for GATE Classe
FRIDAT	CSE	V. DC Lab	EI		Planning for GATE Classes
	ME	Virtual IC	ELAB		Planning for GATE Classe
	EEE	√. LCT lab	Minor Project		Planning for GATE Classe
ATTINOAN	CE	FE	DHS		Planning for GATE Classe
SATURDAT	CSE	V. Al Lab	AI		Planning for GATE Classe
	ME	ICE	AM		Planning for GATE Classes
	EFF / Pak 4				
ENI.	EEE (/th :	Sem)	CN .	ME (	/th Sem)
1	Subject	Faculty Mr. Shalti D.d. Sumanuti	DIN.	Subject	Paculty
	SCD	Mr. Shakii Pd. Senapati	1	RAC	Mr. Madhav Ram
2	DDAS	Mr. Ravi Kumar	2	OR	Mr. Rajat Gupta
4	LCT	Mr. Abbil Md. VV	3	CAD/CAM	Mr. Wichnei Singh
5	Ind Tra	Mr. Discalar/Mr. Tabich	4	ANA	Mr. Vishnu Singh
6	Project	Dr. Amit Kumar	6	GATE Classer	Mr. Visninu Singn
7	GATE-Class	Mr. Deemak Singh	0	GATE-Classes	Wit, Prabhakar Kumar
	CE (7th S	em)		CSE	7th Sem)
SN	Subject	Faculty	SN	Subject	Faculty
1	DHS	Mr. Ravi Ranian Kumar	1	Al	Mr. Dhirendra Kumar
2	EE-II	Mr. Jitendra Kumar	2	DC	Mr. Sunil Kumar Sahu
3	DCS-II	Mr. Ahsan Rabbani	3	EI	Mis. Poonam Prabha
4	FE (Elective -	Mr. Prashant Kumar	4	EII	Mr. Anand Kamal
5	FE	Mr. Ravi Ranjan Kumar	5	EIII	Mr. Zoheb Hasan
6	TE-II	Mr. Aditya Kumar	6	Ind. Tra.	Mr. Ajit Kumar Gupta
7	Ind. Tra.	All Faculty	7	Project	Mr. Ajit Kumar Gupta
8	Project	All Faculty	8	GATE-Classes	Mr. Zoheb Hasan
	CO ATTEN COL	AL D D D	1		

# TIME TABLE OF 7<sup>TH</sup> SEMESTER

HOD (EEE) tine incharge

HOD (ME)

Routine Incharge

HOD(CSE) DCE Dar

#### **Course Handout**

Institute/College Name:	Darbhanga College of Engineering
Program Name:	B.Tech (CE, 7 <sup>th</sup> semester)
Course Code:	011722
Course Name:	FOUNADATION ENGINEERING
Lecture/Tutorial(per week):	4/0
Course Credits:	3
Course Co-coordinator Name:	Mr. Ravi Ranjan Kumar

### Vision of the 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 teachinglearning 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 social-cultural 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 Specific Outcomes (PSO):

**PSO1:** Students will be able to use advanced modern methods and tools like GIS, Auto CAD, Staad Pro, Total station to function as design consultants.

PSO2: Graduates will able to develop knowledge in some specific technical areas of civil engineering like

Structural, Geotechnical, Transportation, Earthquake, Geomatics and Environmental Engineering.

#### Civil Engineering Student Program Outcomes (PO)

Students who complete the B.TECH degree in CE will be able to:

#### **Program Outcomes:**

- 1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- 6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. **Environment and sustainability**: Understand the impact of the professional engineering Solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### Course objectives & course outcomes (CO's)

The objective of this course is to provide the students necessary geotechnical engineering skills to analyze and design shallow and deep foundation systems under different loading and soil conditions. To discuss and evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior.

#### **Course Outcomes**

At the end of the **course**, the student will be able to:

**CO1**: to understand the different types of foundation & its functions.

**CO2**: Identify a suitable foundation system for a structure.

**CO3**: Understand about various analysis and design of foundation.

**CO4**: Evaluate the importance of raft foundation and principles of design for buildings and tower structures.

#### **SYLLABUS**

#### **011722 FOUNDATION ENGINEERING**

L-T-P: 3-0-0 THEORY: 1. Explorations, Geographical Investigation, Characterization of ground, site investigations, method of drilling, sampling. Lecture: 4 2. Bearing Capacity, general, local and punching shear failures, correction for size, shape, depth, water table, eccentricity, ultimate and allowable Bearing capacities, Effect of ground

3. In-situ tests: SPT, CPT, plates load tests, methods for ultimate bearing capacity based on in situ tests. Lecture: 3

4. Settlement of foundations:

water level.

5. Pile foundation: Introduction, Pile classification, Pile installation, cast in sine pile, Driven pile, load carrying capacity of pile by state and dynamic methods, Pile load test, Pile groups, laterally loaded piles. Lecture: 8

6. Caisson and Well Foundation:-Types of Caisson, Components of Well foundation, Stability

Credit: 3

Lecture: 5

# Lecture: 3

analysis of well foundation, Tilt and Shift.

7. Expansive Soils: Identification, swelling pressure, Foundation on expansive soil,Stabilization of expansive soils.Lecture: 5

8. Bridge foundations caissons, coffer dams. Excavation and dewatering for foundation.
Failures and strengthening, Foundations on weak soils, reclaimed areas, swelling soils and foundations on expansive soils, arching in soil.
Lecture : 5

9. Machine foundations: Types, Basic definitions. Degree of Freedom of a Block foundation,
General criteria for design of machine foundation, 'Free and forced Vibrations and machine foundations subjected in impact loads.

#### GATE SYLLABUS FOUNDATION ENGINEERING

Foundation Engineering: Sub-surface investigations - scope, drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests; Stress distribution in soils - Boussinesq's and Westergaard's theories, pressure bulbs; Shallow foundations - Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table; Combined footing and raft foundation; Contact pressure; Settlement analysis in sands and clays; Deep foundations - types of piles, dynamic and static formulae, load capacity of piles in sands and clays, pile load test, negative skin friction.

SN	Name of the Students	Branch	Semester	Registration number
1	Abhishek Raj	CE	7th	17101111059
2	Akash Raman	CE	7TH	17101111008
3	Amit Kumar	CE	7th	17101111020

# STUDENTS LIST OF (7<sup>TH</sup> SEMESTER) CIVIL DEPARTMENT

4	Amit kumar	CE	7th	18101111001
5	Anshu Kumar	CE	7th	17101111025
6	AJIT KUMAR YADAV	CE	7th	17101111058
7	ANISH ANAND	CE	7th	17101111022
8	ASHISH KUMAR	CE	7th	17101111042
9	ASHUTOSH KUMAR	CE	7th	17101111010
10	Arun Kumar	CE	7th	17101111001
11	Bauski Kumar	CE	7th	17101111012
12	CHANDAN KUMAR	CE	7th	17101111028
13	Darpan Kumar	CE	7th	17101111044
14	DEEPAK KUMAR	CE	7th	17101111005
15	DEEPAK KUMAR	CE	7th	17101111016
16	Deepak kumar	CE	7th	18101111909
17	INDRA KUMAR	CE	7th	18101111905
18	Isaac Arya	CE	7th	17101111037
19	KETAN SINHA	CE	7th	17101111003
20	krishna arya	CE	7th	17101111056
21	Lalu Kumar	CE	7th	17101111047
22	Manikant kumar	CE	7th	17101111006
23	Manish Kumar	CE	7th	17101111033
24	Manish Kumar Singh	CE	7th	17101111065
25	Masoom Akhtar	CE	7th	17101111052
26	Md Estekhar Alam	CE	7th	17101111049
27	MD MATLUB NEYAZ	CE	7th	17101111004
28	MUKUL KUMAR	CE	7th	17101111054
29	Meera Kumari	CE	7th	17101111039
30	Naveen kumar	CE	7th	17101111030
31	NAVEEN KUMAR	CE	7th	18101111908
32	NAVIN KUMAR	CE	7th	17101111035
33	NEHAL RAJ	CE	7th	17101111040
34	NIRANJAN KUMAR	CE	7th	17101111063
35	NITISH KUMAR	CE	7th	17101111011
36	NITISH KUMAR	CE	7th	17101111064
37	NITISH KUMAR	CE	7th	18101111903
38	Om Prakash	CE	7th	17101111043
39	Pradumn kumar	CE	7th	17101111002
40	PRATIK KUMAR	CE	7th	17101111057
41	Praveen Kumar	CE	7th	17101111034
42	Prince Kumar	CE	7th	17101111046
43	Radhesh jha suman	CE	7th	17101111021
44	RAHUL KUMAR	CE	7th	17101111060

45	Rakesh kumar	CE	7th	17101111031
46	Rakesh Kumar	CE	7th	17101111062
	RAKESH KUMAR			
47	МАНТО	CE	7th	17101111017
48	Ram bilash yadav	CE	7th	17101111023
	RANJEET KUMAR			
49	РАТНАК	CE	7th	17101111032
50	Ranveer kumar yadav	CE	7th	18101111902
51	SACHIN KUMAR	CE	7th	17101111024
52	SANDEEP KUMAR	CE	7th	17101111014
53	Sanjeet Kr Prabhakar	CE	7th	17101111029
54	Sanjeev Kumar Singh	CE	7th	17101111013
55	Santosh Anand	CE	7th	17101111048
56	Shubham kumar	CE	7th	17101111015
57	SHUBHAM RAJ	CE	7th	17101111055
58	SITA RAM YADAV	CE	7th	18101111901
59	snehlata	CE	7th	17101111041
60	Sonika Niranjan	CE	7th	18101111904
61	sumit kumar	CE	7th	18101111906
62	SURAJ KUMAR	CE	7th	17101111007
63	Surendra Kumar sahu	CE	7th	17101111009
64	TARUN KUMAR	CE	7th	17101111050
65	Uday Lal das	CE	7th	17101111026
66	Uma Shankar	CE	7th	17101111018
67	VIKASH KUMAR	CE	7th	17101111038
68	VIKASH KUMAR	CE	7th	17101111045
69	Vikram kumar	CE	7th	17101111061
70	Vishal Kumar	CE	7th	17101111036
71	VIVEK MANI	CE	7th	17101111066

#### Text Books (T)

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 1992.

#### Reference Books (R)

1. Foundation Engineering by R.B. Peck, W. E. Hanson and T. H. Thournburn, John Wiley, New York.

2. Foundation analysis Design by J.E. Bowles, McGraw Hill Book co. New York.

3. Foundation Engineering by G.A.Leonard, McGraw Hill Book co. New York.

4. Engineering Principle of Ground Modification by M.R.Hausmann, McGraw Hill International edition, New York.

#### **Other readings and relevant websites**

SL. No.	Link of journals, Magazines, websites and Research papers
1.	https://lecturenotes.in/subject/172/foundation-engineering
2.	https://easyengineering.net/ce6502-foundation-engineering-books/
3.	https://nptel.ac.in/courses/105/101/105101083/
4.	https://learnengineering.in/ce8591-foundation-engineering/
5.	https://www.vidyarthiplus.com/vp/Thread-CE6502-Foundation-Engineering-Lecture-Notes
6.	https://www.youtube.com/watch?v=XOPzDPz0cuc

#### LECTURE PLAN

Lecture Nos.	Learning objective	Topics to be covered	Books
1-4	Exploration	Explorations, Geographical Investigation, Characterization of ground, site investigations, method of drilling, sampling.	T1,R1
5-9	Bearing Capacity	Bearing Capacity, general, local and punching shear failures, correction for size, shape, depth, water table, eccentricity, ultimate and allowable Bearing capacities, Effect of ground water level.	T1,R1

10-12	In-situ tests	SPT, CPT, plates load tests, methods for ultimate bearing capacity based on in situ tests.	T1,R1
13-15	Settlement of foundation	Settlement, components of settlement & its estimation, permissible settlement, Proportioning of footing for equal settlement.	T1,R1
16-23	Pile foundation	Pile foundation: Introduction, Pile classification, Pile installation, cast in sine pile, Driven pile, load carrying capacity of pile by state and dynamic methods, Pile load test, Pile groups, laterally loaded piles.	T1,R1
24-28	Caisson and Well Foundatio n	Types of Caisson, Components of Well foundation, Stability analysis of well foundation, Tilt. and Shift.	T1,R1
29-33	Expansive Soils	Identification, swelling pressure, Foundation on expansive soil, Stabilization of expansive soils.	T1,R1
34-38	Bridge foundations caissons,	Bridge foundations caissons, coffer dams. Excavation and dewatering for foundation. Failures and strengthening, Foundations on weak soils, reclaimed areas, swelling soils and foundations on expansive soils, arching in soil.	T1,R1
39-47	Machine foundations	Types, Basic definitions. Degree of Freedom of a Block foundation, General criteria for design of machine foundation, 'Free and forced Vibrations and machine foundations subjected in impact loads.	T1,R1

### **Evaluation and Examination Blue Prints:**

Internal assessment is done through quiz tests, Sessional test, assignments. Two sets of question paper are asked from each faculty and out of these two, without the knowledge of faculty, one question paper is chosen for the concerned examination. Examination rules and regulations are uploaded on the student's portals. Evaluation is a very transparent process and the answer sheets of sessional tests, internal assessment assignments are returned back to the students.

The components of evaluation along with their weightage followed by the university is given

below:

Component-1	Sessional test-1	20%
Component-2	Assignments, Quiz's, Test, Attendance	10%
**Component-3	End Term Examination**	70%
Тс	100%	

\*\*The end term comprehensive examination will be held at the end of semester. The mandatory requirement of 75% attendance in all theory classes is to be met for being eligible to appear in this component.

### DARBHANGA COLLEGE OF ENGINEERING

### DARBHANGA

DEPARTMENT OF CIVIL ENGINEERING

Assignment 1

Assignment 2

Assignment 3