



List of New Course(s) Introduced

Department : *Civil Engineering*

Programme Name : PhD

Academic Year : *2021-22*

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	CEPHDT07	Multimodal Transportation System
02.	CEPHDT08	Design and Construction of rural roads
03.	CEPHDT09	Advanced Highway Materials
04.	CEPHDT10	Transportation geotechnics
05.	CEPHDT11	Geo-environmental engineering
06.	CEPHDT12	Soil-structure interaction



Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2021-22

School : *School of Studies of Engineering and Technology*

Department : *Civil Engineering*

Date and Time : *December 20, 2021 - online*

Venue : *Department of Civil Engineering*

2/22/21, 9:47 AM

Email

<shailendrakmr@yahoo.co.in>, "rkchoubey ggv" <rkchoubey.ggv@gmail.com>, "aparashar08" <aparashar08@gmail.com>

Sent: Monday, December 20, 2021 6:17:47 PM

Subject: Request for Approval of Pre-PhD Course Work Syllabus.

Dear Sir,

The Pre-PhD course work scheme and syllabus was approved on 24-09-2019. During that time we included only subjects related to structural engineering due to the availability of supervisors only in structural engineering. During the academic session 2021-22, the supervisors also available in the area of transportation and soil mechanics. Further, the Pre-PhD students have also admitted in these areas. Accordingly we added some courses related to these areas in the existing structural engineering courses. In this regard I hereby attached scheme and syllabus of the revised Pre-PhD course work for perusal and approval by circulation.

It is therefore requested to make suggestions if any and approve the revised pre-PhD scheme and syllabus by reply mail.

Thanks and Regards

Dr. M. Chakradhara Rao
(Ph.D., IIT Kharagpur, India)
Associate Professor & Head
Department of Civil Engineering,
SoS Engineering & Technology
Guru Ghasidas Vishwavidyalaya (A Central University), Koni, Bilaspur Chhattisgarh - 495009, India.
Phone: +91 7752 260429/260007(O), +91 8770504793(M)
Email: rao_chakradhar@gmail.com

From : Department of Civil Engineering GGU Bilaspur <hodcivilengg@ggu.ac.in> Tue, Dec 21, 2021 10:30 AM
Subject : Fwd: Request for Approval of Pre-PhD Course Work Syllabus. 1 attachment
To : ukdewangan ce <ukdewangan.ce@nitrr.ac.in>

Dear Sir,

I hereby forwarded the same for your perusal and approval please.

Regards

Dr. M. Chakradhara Rao
(Ph.D., IIT Kharagpur, India)
Associate Professor & Head
Department of Civil Engineering,
SoS Engineering & Technology
Guru Ghasidas Vishwavidyalaya (A Central University), Koni, Bilaspur Chhattisgarh - 495009, India.
Phone: +91 7752 260429/260007(O), +91 8770504793(M)
Email: rao.chakradhar@gmail.com

https://email.gov.in/#/printmessage?id=C.16257&tz=Asia/Kolkata&xim=1

2/



10:50 AM

Email

Department of Civil Engineering GGU Bilaspur

: Request for Approval of Pre-PhD Course Work Syllabus.

From : shailendrakmr@yahoo.co.in

Wed, Dec 22, 2021 10:12 AM

Subject : Re: Request for Approval of Pre-PhD Course Work Syllabus.

To : dewangan umesh25
<dewangan.umesh25@gmail.com>, rkchoubey gg
<rkchoubey.ggv@gmail.com>, aparashar08@gmail.com, Department of Civil Engineering GGU Bilaspur <hodcivilengg@ggu.ac.in>

Reply To : Shailendra Kumar <shailendrakmr@yahoo.co.in>

Dr. MC Rao
HoD, Civil Engg, GGV

Sir,
The revised pre-PhD scheme and syllabus as proposed herewith is approved.

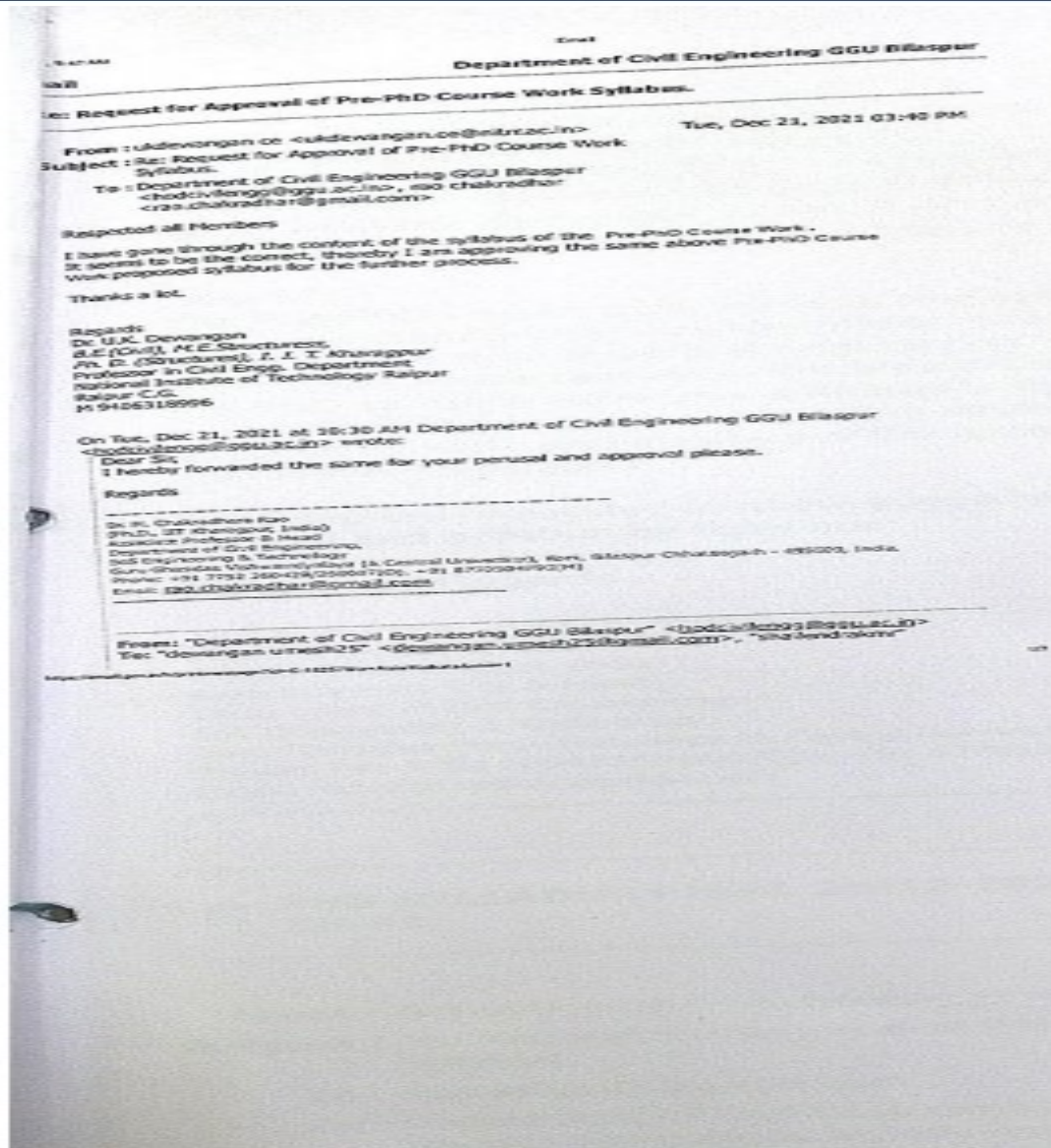
Regards.

Shailendra Kumar
(Ph.D., IIT Kharagpur, India)
Professor
Department of Civil Engineering,
School of Engineering & Technology
Guru Ghasidas Vishwavidyalaya (A Central University), Koni, Bilaspur Chhattisgarh - 495009, India.
Phone: +91 7752 260429/260007(O), +91 7999517050(M)
Email: shailendrakmr@yahoo.co.in

On Monday, 20 December, 2021, 06:17:56 pm IST, Department of Civil Engineering GGU Bilaspur <hodcivilengg@ggu.ac.in> wrote:

Dear Sir,
The Pre-PhD course work scheme and syllabus was approved on 24-09-2019. During that time we included only subjects related to structural engineering due to the availability of supervisors only in structural engineering. During the academic session 2021-22, the supervisors also available in the area of transportation and soil mechanics. Further, the Pre-PhD students have also admitted in these areas. Accordingly we added some courses related to these areas in the existing structural engineering courses. In this regard I hereby attached scheme and syllabus of the revised Pre-PhD course work for perusal and approval by circulation.

ps://mail.ggv.in/h/printmessage?id=C:16257&tz=Asia/Kolkata&xm=1





20221, 9:47 AM

Email

From: "Department of Civil Engineering GGU Bilaspur" <hodcivilengg@ggu.ac.in>
To: "dewangan umesh25" <dewangan.umesh25@gmail.com>, "shailendrakmr" <shailendrakmr@yahoo.co.in>, "rkchoubey gg" <rkchoubey.ggv@gmail.com>, "aparashar08" <aparashar08@gmail.com>
Sent: Monday, December 20, 2021 6:17:47 PM
Subject: Request for Approval of Pre-PhD Course Work Syllabus.

Dear Sir,
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Thanks and Regards

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Guru Ghasidas Vishwavidyalaya (A Central University), Koni, Bilaspur Chhattisgarh - 495009, India.
Phone: +91 7752 260429/260007(O), +91 8770564793(M)
Email: rao.chakradhar@gmail.com

PHD SYLLABUS FINAL 20-12-2021.pdf
280 KB

From: rkchoubey gg <rkchoubey.ggv@gmail.com> Mon, Dec 20, 2021 09:06 PM
Subject: Re: Request for Approval of Pre-PhD Course Work Syllabus.
To: aparashar08@gmail.com
Cc: Department of Civil Engineering GGU Bilaspur <hodcivilengg@ggu.ac.in>, dewangan umesh25 <dewangan.umesh25@gmail.com>, shailendrakmr@yahoo.co.in

Revised pre-PhD scheme and syllabus as proposed herewith is approved, please.

On Mon, Dec 20, 2021 at 6:50 PM Ashish Parashar <aparashar08@gmail.com> wrote:

<https://mail.ggu.in/printmessage?id=C:16257&tz=Asia/Kolkata&im=1>

3/7



12/21, 9:47 AM

Email

From: "Department of Civil Engineering GGU Bilaspur" <hoddcivilengg@ggu.ac.in>
To: "dewangan umesh25" <dewangan.umesh25@gmail.com>, "shailendrakmr" <shailendrakmr@yahoo.co.in>, "rkchoubey ggv" <rkchoubey.ggv@gmail.com>, "aparashar08" <aparashar08@gmail.com>
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Subject: Request for Approval of Pre-PhD Course Work Syllabus.

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Phone: +91 7752 260429/260007(O), +91 8770501793(M)
Email: rao.chakradhar@gmail.com

PHD SYLLABUS FINAL 20-12-2021.pdf
280 KB

From : aparashar08@gmail.com
Subject : Re: Request for Approval of Pre-PhD Course Work Syllabus.
To : Department of Civil Engineering GGU Bilaspur <hoddcivilengg@ggu.ac.in>
Cc : dewangan umesh25 <dewangan.umesh25@gmail.com>, shailendrakmr@yahoo.co.in, rkchoubey ggv <rkchoubey.ggv@gmail.com>

Mon, Dec 20, 2021 07:04 PM

Please go ahead.
Ashish Kumar Parashar

On Mon, 20 Dec 2021 at 18:17, Department of Civil Engineering GGU Bilaspur <hoddcivilengg@ggu.ac.in> wrote:

<https://emse1.gov.in/hi/printmessage?id=C:15257&Lz=Asia/Kolkata&idm=1>

5/7



The following new courses were introduced in the PhD course work of civil engineering:

- ❖ Multimodal Transportation System (CEPHDT07)
- ❖ Design and Construction of rural roads (CEPHDT08)
- ❖ Advanced Highway Materials (CEPHDT09)
- ❖ Transportation geotechnics (CEPHDT10)
- ❖ Geo-environmental engineering (CEPHDT11)
- ❖ Soil-structure interaction (CEPHDT12)

विभागाध्यक्ष
HOD
सिविल इंजीनियरी विभाग
Department of Civil Engineering,
प्रो.स.गु.घा.विश्वविद्यालय, बिलासपुर (छ.ग.)
I.T., G.G.V. Bilaspur (C.G.)

Signature & Seal of HoD



Scheme and Syllabus

CIVIL ENGINEERING DEPARTMENT
SoS, ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.), 495009

EVALUATION SCHEME OF Pre-Ph. D COURSE WORK
EFFECTIVE FROM SESSION 2021-22

SN	Name of the Subject	Subject Code	Periods / Week L - T - P	ESE Duration	ESE MARKS		Credits
					Max.	Min.	
1	Research Methodology in Engineering	ETPHDT00	3 - 1 - 0	3 Hrs.	100	40	4
2	Elective - I	**	3 - 1 - 0	3 Hrs.	100	40	4
3	Elective - II	**	3 - 1 - 0	3 Hrs.	100	40	4
Total			9 - 3 - 0	-	300	120	12

Note: i) Duration of the semester will be 6 months.
ii) Candidate has to score minimum 55% of the aggregate marks in the course work in order to be eligible to continue in the program leading to the completion of Ph.D.
iii) The student may select any two elective papers from the following list of electives

L : Lecture, T: Theory, P: Practical, Max.: Maximum Marks in ESE; Min.: Minimum Pass Marks in each subject as 50%

LIST OF ELECTIVES

S.NO.	SUBJECT CODE	TITLE OF THE SUBJECT
ELECTIVE-I & II		
1	CEPHDT01	OPTIMIZATION TECHNIQUES
2	CEPHDT02	FINITE ELEMENT METHOD
3	CEPHDT03	STRUCTURAL DYNAMICS
4	CEPHDT04	ADVANCED CONCRETE TECHNOLOGY
5	CEPHDT05	CONCRETE FRACTURE MECHANICS
6	CEPHDT06	SPECIAL CONCRETES
7	CEPHDT07	MULTIMODAL TRANSPORTATION SYSTEM
8	CEPHDT08	DESIGN AND CONSTRUCTION OF RURAL ROADS
9	CEPHDT09	ADVANCED HIGHWAY MATERIALS
10	CEPHDT10	TRANSPORTATION GEOTECHNICS
11	CEPHDT11	GEO-ENVIRONMENTAL ENGINEERING
12	CEPHDT12	SOIL - STRUCTURE INTERACTION

20/12/2024



CEPhDT07: Multimodal Transportation System
(03-01-00 = 04 credits)

Course Content

Unit-I: Artificial Intelligence based Transportation System: Urbanization and transportation, Travel demand impacts of urbanization, Modal share, Motorization, Introduction to AI, components of transportation system that require optimization, role of AI in optimization of these components, congestion control, accident avoidance, active alert system design

Unit-II: Geographic information system-based transportation system: Introduction to GIS, sources of GIS, role of GIS in transportation, assessment of roads, and railways using GIS, case study of smart city GIS

Unit-III: Introduction of signal processing: Overview of Signal processing, Fundamentals of Image processing; Fundamental signals (1-D, 2-D and 3-D); Classification of systems; Characteristics of LTI/LSI systems. Application of Image Processing in Urban Transportation Systems

Unit-IV: Non-Motorized Transportation (NMT) Systems: Components of NMT, categories of NMT, planning smart cities to facilitate NMT, effect of NMT planning on healthcare

Unit-V: Pedestrian Safety: Urban Pedestrian Safety- Skyways, Intersection subways, halt stations, crossing measures, flexibility in accessibility, design of collision control systems for intersections to improve pedestrian safety

Reference Books

1. O. Flaherty C.A., "Traffic Engineering and Transport Planning", Butterworth Heinemann, Elsevier, Burlington, MA 2006.
2. M.A. Chowdhury and A. Sadek, Fundamentals of Intelligent Transportation Systems Planning, Artech House, 2010.
3. Gonzalez R. C. and Woods R. C., "Digital Image Processing", 2nd Ed., Pearson Education, 2007.
4. Jain A. K., "Fundamentals of Digital Image Processing", Prentice Hall, 2007.

CEPhDT08: Design and Construction of Rural Roads
(03-01-00 = 04 credits)

Course Content

Unit-I: Introduction about Rural Roads and Planning and Alignment: Importance of Rural roads, Classification of rural roads, Terrain classification, Socio-economic impact of rural roads. Data base for master plan, Concept of network planning, Rural Roads plan, Road alignment, Governing factors for route selection, Factors controlling alignment, Special considerations while aligning hill roads, Surveys, Detailed project report, Environmental issues.

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Unit-II: Geometric Design and Road Materials: Introduction, Design speed, Basic principles of geometric design, Elements, Horizontal and vertical alignment, Alignment compatibility, Lateral and vertical clearances. General, Soil and material surveys, Soil as road construction material, Aggregates for pavement courses, Materials for bituminous construction, Materials for semi-rigid and rigid pavement, Materials for special pavements Climatic suitability of concrete materials

Unit-III: Pavement Design, Specifications and Construction of Rural Roads: Introduction, Design parameters, Pavement components, Design of flexible pavement, Design of semi-rigid pavement, Design of rigid pavement, Drainage and Shoulders. General, Selection of construction materials and methodology, Earthwork, Sub-base, Base course, Bituminous constructions, Semi-rigid pavement construction, Concrete pavements, Equipment required for different operations.

Unit-IV: Use of Waste Materials in Rural Road Construction: Introduction, Significance of green roads, Fly ash for road construction, Iron & steel and copper slags, Recycled concrete aggregate, Other waste materials.

Unit-V: Quality Control Tests & Maintenance: General, Pre-requisite, Specifications and codes of practice, Quality control tests during pavement construction. Distresses/defects in pavements, Types of maintenance, Classification of maintenance activities, Maintenance norms of maintenance cost.

References:

1. Rural Roads Manual, IRC: SP 20-2002
2. Guidelines for the design of flexible pavements for low volume rural roads, IRC: SP: 72-2007
3. Geometric design standards for Rural (Non-Urban) Highways, IRC: 73-1980.
4. Guidelines for quality systems for road construction, IRC: SP: 57-2000.

CEPhDT09: Advanced Highway Materials (03-01-00 = 04 credits)

Course Content

Unit-I: Aggregate: Nature and properties – aggregate requirements – types and processing – aggregates for pavement base – aggregate for bituminous mixture – aggregate for Portland Cement Concrete – light weight aggregate – tests on aggregate – specification.

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Unit-II: Bituminous Materials: conventional and modified binders – production – types and grade – physical and chemical properties and uses – types of asphalt pavement construction – principles of bituminous pavement construction – tests on bituminous materials. Bituminous Mix design – modified mixtures – temperature susceptibility and performance.

Unit-III: Cement /concrete based materials: Cement – properties – PCC mix design and properties – modified PCC – Mix Design – Behaviour – Performance – Tests on Cement and Concrete mixes. High Performance Concrete – low shrinkage – increased strength. Composites,

Unit-IV: Plastics and Geosynthetics: Plastics and polymerization process – properties – durability and chemical composition – Reinforced Polymer Composites – Geosynthetics – Dry Powdered Polymers – Enzymes.

Unit-V: Reclaimed / Recycled Waste Products: Reclaimed Materials – waste products in highway engineering and its applications – effect of waste products on materials, structure and properties – self healing and smart materials – locally available materials.

References:

1. P. T. Sherwood, Alternative Materials in Road Construction, Thomas Telford Publication, London, 1997.
2. RRL, DSIR, Soil Mechanics for Road Engineers, HMSO, London , 1995
3. Koerner, R. M. Designing with Geosynthetics, Prentice Hall, Englewood Cliffs, New Jersey, U.S.A.
4. Shan Somayaji, Civil Engineering Materials, second edition, Prentice Hall Inc., 2001.

CEPhDT10: Transportation Geotechnics (03-01-00 = 04 credits)

Course Content

Subgrade Soil: Classification, desirable properties, determination of soil strength, Swelling and Shrinkage characteristics, Road aggregates: classification, properties of aggregates, design of aggregate gradation; Cyclic response of soils, resilient and plastic behaviour of soils and aggregates, Effects of traffic loads, natural forces, and material quality. Current design practices; Principles and theoretical concepts of rigid and flexible pavements for highways and airfields;

Ground Improvement technics: Need for ground improvement, column methods : sand, stone and lime columns, soil nailing: root piles, soil reinforcement , functions of geosynthetics in soil, soil grouting: electro-chemical stabilization

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Pavement evaluation and performance; Utilization of recycled materials for sustainable pavements; Life cycle cost analysis. Highway embankments; Design and construction of embankments; Stage construction; Introduction to reinforced earth design and construction.

References:

1. Rajib B. Mallick, Tahar El-Korchi. Pavement Engineering: Principles and Practice. CRC Press, 2017.
2. Chakraborty P. and Das, A. Principles of Transportation Engg.. PHI Publication, 1st Edition 2005
3. Papagiannakis A. T. and Masad, E. A. Pavement Design and Materials. Wiley, 2017

CEPhDT11: Geo-environmental Engineering
(03-01-00 = 04 credits)

Course Content

Unit-I: Fundamentals of Geoenvironmental Engineering: Scope of geoenvironmental engineering - multiphase behavior of soil - role of soil in geoenvironmental applications - importance of soil physics, soil chemistry, hydrogeology, biological process - sources and type of ground contamination - impact of ground contamination on geoenvironment - case histories on geoenvironmental problems.

Unit-II: Soil-Water-Contaminant Interaction: Soil mineralogy characterization and its significance in determining soil behavior - soil-water interaction and concepts of double layer - forces of interaction between soil particles. Concepts of unsaturated soil - importance of unsaturated soil in geoenvironmental problems - measurement of soil suction - water retention curves - water flow in saturated and unsaturated zone. Soil-water-contaminant interactions and its implications - Factors effecting retention and transport of contaminants.

Unit-III: Waste Containment System: Evolution of waste containment facilities and disposal practices - Site selection based on environmental impact assessment - different role of soil in waste containment - different components of waste containment system and its stability issues - property evaluation for checking soil suitability for waste containment - design of waste containment facilities.

Unit-IV: Contaminant Site Remediation: Site characterization - risk assessment of contaminated site - remediation methods for soil and groundwater - selection and planning of remediation methods - some examples of in-situ remediation.

Unit-V: Advanced Soil Characterization: Contaminant analysis - water content and permeability measurements - electrical and thermal property evaluation - use of GPR for site evaluation - introduction to geotechnical centrifuge modeling.

References:

1. Rowe R.K., "Geotechnical and Geoenvironmental Engineering Handbook" Kluwer Academic Publications, London, 2000.
2. Sharma H.D. and Reddy K.R., "Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies" John Wiley & Sons, Inc., USA, 2004.

(Handwritten signatures and dates)



3. Yong, R. N., "Geoenvironmental Engineering, Contaminated Soils, Pollutant Fate, and Mitigation" CRC Press, New York, 2001.
4. Alvarez-Benedi J. and Munoz-Carpena, R., "Soil-Water Solute Process Characterization: An Integrated Approach" CRC Press, New York, 2005.
5. Mitchell, J.K., "Fundamentals of Soil Behavior" Wiley, 2005.

CEPhDT12: Soil – Structure Interaction
(03-01-00 = 04 credits)

Course Content

Unit-I : Soil-Foundation Interaction: Introduction to soil-foundation interaction problems, Soil behaviour, Foundation behaviour, Interface behaviour, Scope of soil foundation interaction analysis, soil response models, Winkler, Elastic continuum, Two parameter elastic models, Elastic-plastic behaviour, Time dependent behaviour.

Unit-II : Beam on Elastic Foundation- Soil Models: Infinite beam, Two-parameters models, Isotropic elastic half space model, Analysis of beams of finite length, combined footings.

Unit-III : Plates on Elastic Continuum: Thin and thick rafts, Analysis of finite plates, Numerical analysis of finite plates.

Unit-IV: Analysis of Axially and Laterally Loaded Piles and Pile Groups: Elastic analysis of single pile, Theoretical solutions for settlement and load distributions, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap, Load deflection prediction for laterally loaded piles, Subgrade reaction and elastic analysis, Interaction analysis, Pile-raft system,

References:

1. Selvadurai, A. P. S. – "Elastic Analysis of Soil-Foundation Interaction", 1979
2. Rolando P. Orense, Nawawi Chow & Michael J. Pender – "Soil-Foundation-Structure Interaction", CRC Press, 2010 Taylor & Francis Group, London, UK.
3. "Soil Structure Interaction – The real behaviour of structures", the institution of structural engineers, London, March 1989.
4. Poulos, H. G., and Davis, E. H. – "Pile Foundation Analysis and Design", 1980
5. Scott, R. F. – "Foundation Analysis", Prentice Hall, Englewood Cliffs, 1981
6. Bowles, J. E. – "Foundation Analysis & Design", 5th Edition McGraw-Hill Companies, Inc. (1996)
7. Das, B. M. – "Principles of Foundation Engineering", 5th Edition Nelson Engineering (2004)

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