

Department of Civil Engineering
J.C Bose University of Science and Technology, YMCA
Faridabad

Ph.D. COURSES

Choice Based Credit System(CBCS)

Scheme & Syllabus

S.N.	Subject	L T P	Int. Marks	Ext. Marks	Total	Credit	Meant for
1	PhD 100A: Research Methodology	4 0 0	25	75	100	4	Employability
2	Research and Publications Ethics	2 0 0	25	75	100	2	Employability
3	ADVANCED MATERIALS IN STRUCTURES	4 0 0	25	75	100	4	Employability
4	Engineering Behaviour of Soils	4 0 0	25	75	100	4	Employability

Ph.D. COURSE WORK

PhD 100A: Research Methodology- 4 Credits

Research and Publications Ethics (CPE-RPE)- 2 credits

Electives (One as per research area):

1.PHDCE 101:ADVANCED MATERIALS IN STRUCTURES

2.PHDCVE 102:Engineering Behaviour of Soils

PHDCE 101:ADVANCED MATERIALS IN STRUCTURES

Course Code:PHDCVE 101

Credit Units: 04

L T P 4 0 0

Sessional=25 External Exam.75, Total=100

Course Objectives:The students will be able to

1. Understand the different building materials properties
2. Determine behavior and properties of concrete
3. Determine the Non- destructive behavior analysis of concrete
4. Assess the different properties of fiber reinforced concrete and high performance concrete

Pre-requisites: Basic knowledge of Concrete Technology

Student Learning Outcomes:

Research in materials in structures can improve students' knowledge in the areas like emerging sustainable building materials, concrete behavior, non-destructive techniques and high performance concrete.

Module 1:Natural Building Materials, Recycled Building Materials, Materials- Cement, Aggregates, Fresh and hardened concrete, Admixtures- types of admixtures- purposes of using admixtures- chemical composition- effect of admixtures on fresh and hardened concretes- Natural admixtures.

Module 2:Non destructive evaluation: Importance, Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

Module 3:Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes. Light weight concrete- Introduction- properties of light weight concrete- No fines concrete design of light weight concrete.

Module 4:Flyash concrete- Introduction- classification of flyash- properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes.

Module 5: High performance concretes- Introduction- Development of high performance concretes Materials of high performance concretes- Properties of high performance concretes.

TextBooks:

1. Concrete technology- Neville & Brooks
2. Special Structural concrete- Rafat Siddique
3. Concrete repair and maintenance illustrated- Peter H Emmons
4. Concrete technology-M S Shetty

PHDCVE 102:Engineering Behaviour of Soils

Course Code:PHDCVE 102

Credit Units: 04

L T P 4 0 0

Sessional=25 External Exam.75, Total=100

Course Objectives:The students will be able to

1. Understand the soil structure and properties
2. Use Mohr circle for predicting stress-strain behavior of soils
3. Analyze the soil consolidation and pore pressure parameters
4. Assess the shear strength parameters of soil
5. Prepare effecting foundation design solution based on the predicted soil behavior

Pre-requisites: Basic knowledge of Geotechnical Engineering

Student Learning Outcomes:

Research in geotechnical engineering can improve students' knowledge in the areas like soil mechanics, soil dynamics and earthquake engineering or gaining new knowledge in the newly emerging areas like mechanics of unsaturated geo materials

Module I

Origin, soil composition, soil classification, Clay mineralogy, Soil fabric and structure, Clay-water forces, Inter-particle forces, Environmental factors

Module II

Dry Soils: Mohr circle, Stress-strain behavior of sand, Earth pressures theories, Infinite slopes, retaining walls

Module III

Saturated soils (Steady state flow): Effective stress principle and effect of flow on effective stress, Capillarity, Soil suction, Determination of coefficient of permeability, Stress-strain behavior of clays, Drained shear behavior of soils, One-dimensional consolidation

Module IV

Saturated soils (Transient flow): Pore pressure parameters, Undrained shear strength of clays, two and three dimensional consolidation

Tests for determination of consolidation parameters, Stress-paths

Module V

Triaxial and direct shear tests, Shear behaviour of soils under static and dynamic loads, Determination of parameters, Shear behavior of fine grained soils, Pore-pressure parameters. UU, CU, CD tests, Total and effective stress-strength parameters, Total and effective stress-paths

Module VI

Critical state constitutive models, Case histories on soil failure and structural damage

Text & References:

- Soil Mechanics by Braja M. Das
- Soil Mechanics Fundamentals by Muni Budhu
- Soil Mechanics concepts and applications by William Powrie
- Geotechnical Engineering by B C Punmia
- Soil Mechanics by Lambe and Whitman

PHD – 100A
RESEARCH METHODOLOGY
PhD (Common Subject)

No. of Credits: 4
L | T | P | Total
4 | 0 | 0 | 4

Sessional: 25 Marks
Theory: 75 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Course Objectives:

- Understand research process in order to plan a research proposal
- Learn methods to devise and design a research set-up
- Plan and perform data collection methods and its analysis
- Conclude research in report writing

Course Outcomes: The research scholar shall be able to

- CO1 Plan a research proposal and design the research.
CO2 Collect data through experiments or surveys as per research requirement.
CO3 Understand and apply sampling and sampling distributions.
CO4 Understand and perform quantitative and qualitative data analysis.
CO5 Write research report with proper citations.

Unit 1 Introduction to Research: Definition, need and purpose of research, types of research, research process, approaches to research, planning a research proposal, literature review.

Unit 2 Measurement Scales: Indexes vs. Scales, Types of Scale, construction of Scale, Bogardus social distance scale, Thurstone Scale, Likert Scale, Semantic Differential Scale, Guttman Scale.

Unit 3 Data Collection Methods: Experiments and Surveys, Experiments: Classical Experiments, Independent & Dependent Variables, Pre Testing & Post Testing, Double Blind Experiment, Subject Selection, Variation on Experiment Design. Survey Research: Topics appropriate for survey research, Guidelines for asking questions, Questionnaire Construction, Strengths & Weakness of Survey Research, Types of Surveys.

Unit 4 Sampling: Types of sampling methods: Non Probability Sampling, Probability Sampling, Theory & Logic of Probability Sampling, Sampling Distributions & Estimates of Sampling Error.

Unit 5 Data Analysis: Qualitative v/s Quantitative data analysis, Qualitative Data Analysis: Discovering Patterns, Grounded Theory Method, Semiotics, Conversation Analysis, Qualitative Data Processing. Quantitative Data Analysis: Quantification of Data, Univariate Analysis, Bivariate Analysis, Multivariate Analysis, Regression Analysis, Description Analysis. Hypothesis. Multiple Attribute Decision Making.

Unit 6 Report Writing, Ethical Issues and Outcomes: Report Preparation, Structure of Report, Report Writing Skills, Citations, Research Papers, Intellectual Property Rights, Plagiarism, Patent, Commercialization, Ethical Issues.

References:

1. Research Methodology by R. Panneerselvam, PHI.
2. Research Methodology by C.R. Kothari & Gaurav Garg, New Age Publishers.
3. Research Methodology by Deepak Chawla and Neena Sondhi, Vikas Publishing.
4. The practice of social research by Earl Babbie, Cengage.
5. Multiple Attribute Decision Making, Gwo-Hshiong Tzeng and Jih-Jeng Huang, CRC Press
6. Research Methodology by Ranjit Kumar, Sage Publications.

Course Code: CPE- RPE
Research and Publication Ethics

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	30

Syllabus in detail

THEORY

- RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 - Introduction to philosophy: definition, nature and scope, concept, branches
 - Ethics: definition, moral philosophy, nature of moral judgements and reactions
- RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 - Ethics with respect to science and research
 - Intellectual honesty and research integrity
 - Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 - Redundant publications: duplicate and overlapping publications, salami slicing
 - Selective reporting and misrepresentation of data
- RPE 03: PUBLICATION ETHICS (7 hrs.)**
 - Publication ethics: definition, introduction and importance
 - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 - Conflicts of interest
 - Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 - Violation of publication ethics, authorship and contributorship
 - Identification of publication misconduct, complaints and appeals
 - Predatory publishers and journals

PRACTICE

- RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

- A. Group Discussions (2 hrs.)**

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

- B. Software tools (2 hrs.)**

Use of plagiarism software like Turnitin, Urkund and other open source software tools

- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

- A. Databases (4 hrs.)**

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

- B. Research Metrics (3 hrs.)**

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

References

- Bird, A. (2006). *Philosophy of Science*. Routledge.
- MacIntyre, Alasdair (1967) *A Short History of Ethics*. London.
- P. Chaddah, (2018) *Ethics in Competitive Research: Do not get scooped; do not get plagiarized*, ISBN:978-9387480865
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). *On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition*. National Academies Press.
- Resnik, D. B. (2011). What is ethics in research & why is it important. *National Institute of Environmental Health Sciences*, 1–10. Retrieved from <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. *Nature*, 489(7415), 179–179. <https://doi.org/10.1038/489179a>
- Indian National Science Academy (INSA), *Ethics in Science Education, Research and Governance*(2019), ISBN:978-81-939482-1-7. http://www.insaindia.res.in/pdf/Ethics_Book.pdf