

## **RULES & REGULATIONS**

### **Appendix for Revised rules for Ph. D for Faculty of Engineering (Architecture and Planning)**

The candidates who have registered for Ph.D. Program on or after 11th July 2009 are governed by UGC (MINIMUM STANDARDS AND PROCEDURE FOR AWARD OF M.Phil/Ph.D. DEGREE), REGULATION, and 2009 PUBLISHED IN THE GAZETTE OF INDIA, DATED 11TH July, 2009.

Based on and adhering to this, University of Pune has formulated the Revised rules for Ph.D. and circulated vide circular no.406/2009 dated 29th December 2009.

All the Procedures, rules and regulations regarding Short title, Applications, Commencement, Supervisor Eligibility Criterion, Procedure for Admission, Course work, Evaluation, and Assessment methods etc. as laid down in these revised rules, are applicable to PhD Programs for Faculty of Engineering (Architecture), University of Pune.

The following guidelines are a supplement to these rules and regulations; for only those sections, which require better and adequate comprehension.

#### **Course Work for Ph. D. in Architecture and Planning**

**Table-1**

#### **Structure for Ph.D. Course Work for Architecture & Planning**

CODE	NAME OF COURSE	CONTACT HOURS	EXAMINATION SCHEME			CREDITS
			CONTINUOUS ASSESSMENT	END SEMESTER EXAM	TOTAL	
700001	Research Methodology	5	50	100	150	5
700002	Seminar	10	50	50	100	5
700003	Faculty Specific for Architecture Research Part-A (700003-A) Methodologies for Architectural Research Part-B (700003-B) Branch Specific Topics	10	100	100	200	10
<b>Total</b>		<b>25</b>	<b>200</b>	<b>250</b>	<b>450</b>	<b>20</b>

## SYLLABUS

### Ph.D. COURSEWORK UNDER FACULTY of ENGINEERING

#### (ARCHITECTURE & PLANNING)

##### 700001: Research Methodology

Teaching Scheme:

Contact Hours: 5 hrs/week

Credits: 5

Marking Scheme:

Continuous Assessment: 50 Marks

End Semester Examination: 100 Marks

#### Objectives

- Learn to focus on a research problem using scientific methods
- Learn methods to devise and design an experimentation set-up
- Learn basic instrumentation and data collection methods
- Learn parameter estimation and related modelling methods

#### Unit 1: Research Problem

Meaning of research problem, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

#### Unit 2: Basic instrumentation

Instrumentation schemes, Static and dynamic characteristics of instruments used in experimental set up, Performance under flow or motion conditions, Data collection using a digital computer system, Linear scaling for receiver and fidelity of instrument, Role of DSP is collected data contains noise.

#### Unit 3: Applied statistics

Regression analysis, Parameter estimation, Multivariate statistics, Principal component analysis, Moments and response curve methods, State vector machines and uncertainty analysis.

#### Unit 4: Modelling and prediction of performance

Setting up a computing model to predict performance of experimental system, Multi-scale modelling and verifying performance of process system, Nonlinear analysis of system and asymptotic analysis, Verifying if assumptions hold true for a given apparatus setup, Plotting family of performance curves to study trends and tendencies, Sensitivity theory and applications.

#### Unit 5: Developing a Research Proposal

Format of research proposal, Individual research proposal, Institutional proposal  
Proposal of a student – a presentation and assessment by a review committee consisting of Guide and external expert only. Other faculty members may attend and give suggestions relevant to topic of research.

**Reference Books:**

1. 'Research methodology: an introduction for science & engineering students', by Stuart Melville and Wayne Goddard
  2. 'Research Methodology: An Introduction' by Wayne Goddard and Stuart Melville
  3. 'Research Methodology: A Step by Step Guide for Beginners', by Ranjit Kumar, 2<sup>nd</sup> Edition
  4. 'Research Methodology: Methods and Trends', by Dr. C. R. Kothari
  5. 'Operational Research' by Dr. S.D. Sharma, Kedar Nath Ram Nath & co.
  6. Software Engineering by Pressman
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**700002: Seminar****Teaching Scheme:**

**Contact Hours: 5 hrs/week**  
**Credits: 5**

**Marking Scheme:**

**Continuous Assessment: 50 Marks**  
**End Semester Examination: 50 Marks**

**Unit 1: Formulating Problem Statement**

Overview of research process: Formulating the Research Problem, Extensive Literature Review, Developing the objectives, preparing the Research Design including Sample Design, Collecting the Data, Analysis of Data, Generalization and Interpretation, preparation of the Report or Presentation of Results-Formal write-ups of conclusions reached.

Problem statement – Conditions and steps in selecting a research problem, Understanding the Key research area of interest, How to get new ideas (Criticizing a paper), Finding a good problem: Top-down and Bottom-up approach, Creative thinking techniques, Coming up with a problem statement

Defining objectives – How to find objectives, characteristics of objectives

**Unit 2: Literature survey**

Overview – What is literature survey, Functions of literature survey, maintaining a notebook, developing a Bibliography

Methods of data collection – Observation, survey, contact methods, experimental, determining sample design

Searching for publications – Publication databases, search engines and patent databases, Find some/all of the references for a given paper, including those that are not on the web

Online tools – google, CiteSeer, ACM Digital Library, IEEE, The on-line Computer Science bibliography, Survey papers, Finding material not on the web, Searching patents

**Unit 3: How to study a scientific paper**

Summarizing paper – Reading abstracts and finding ideas, conclusion, Advantages of their approach, the drawbacks of the papers (What is lacking – can be found in the sections such as future work) Generalize results from a research paper to related research problems

Comparing the approach - Identify weaknesses and strengths in recent research articles in the subject

#### **Unit 4: Publishing a paper**

How to write scientific paper - Structure of a conference and journal paper, how (and How Not) to write a Good Systems Paper: Abstract writing, chapter writing, discussion, conclusion, references, bibliography, and In-class discussion of technical writing examples, Poster papers, review papers, how to organize thesis/ Project report, How to write a research proposal? How research is funded?

Research ethics – Legal issues, copyright, plagiarism

General advice about writing technical papers in English - Tips for writing correct English

#### **Unit 5: How to present scientific paper**

Talk structure, basic presentations skills

Documentation and presentation tools – LATEX, Microsoft office, PowerPoint and SLIDESHOW

#### **Reference Books:**

1. Lecture Notes and presentations

## **700003-A: Methodologies for Architecture & Planning Research**

**Note: Each Unit is of 2 credits. A candidate has to take any *two* units (4 credits)**

**Unit 1: Genesis of Architectural Research:** Definition-Importance of Architectural research. Nature and areas of research in architecture,

**Unit 2: Research Typologies in Architectural Research:** Historical studies-Comparative studies-Case studies -Critical Evaluation of buildings.

**Unit 3: Tools for Data Collection: Primary sources:** Survey methods and tools. Secondary sources: archival records, literature survey etc.

**Unit 4: Sampling:** Techniques, Methods and digital analysis techniques.

**Unit 5: Probability and Sampling:** Types of probability, sampling Unit and Frame, Sample Size, Sample Design, Non-response errors Probability and normal distribution-binominal and Poisson distribution.

**Unit 6: Measures of Association and Hypothesis testing:** Percentage difference, Nominal and ordinal measure, The Chi test, The Z-Score Test, The T-Test, and Test for Proportion.

**Unit 7: Correlations and Regression:** Auto correlation based on statistical methods, linear / Non-Linear regression analysis.

**Unit 8: Graph Theory:** Graph as mathematical model, Planar and Dual Graphs, Vector Spaces of a Graph, Matrix Representation of Graphs, Graph Theoretic Algorithms and Computer Programs

**Unit 9: Social Research Methods:** Definitions-approaches, concept and theories

**Unit 10: Visual Research methods:** Environmental Measurement, Imageability and Environmental Mapping etc.

**Unit 11: Qualitative Analysis:** Grounded Theory –Definitions-approaches and concept

**Unit 12: Qualitative Analysis:** conversation and discourse analysis

**Unit 13: Spatial Analysis:** Definitions-approaches, concept and theories

**Unit 14: Phenomenological Study:** Definitions-approaches, concept and analysis

**Unit 15: Environmental Psychological Study:** Introduction to environmental psychology, Roots, Issues, and Principles of environmental psychology,

**Unit 16: Environmental Psychological Study:** Theories and Approaches, Environmental inventory types, etc.

**Unit 17: Concepts and Research Methods in Psychology:**

**Unit 18: Behavioral Science Study:** Methods of knowing, social psychology, experimental and quasi experimental approaches etc.

**Unit 19: Decision making models:** General introduction to various decision making models.

**Reference books:**

1. Groat Linda & Wang D. (2002), Architectural Research Methods, John Wiley and Sons` Inc
2. Sanoff Henry (1991), VISUAL RESEARCH METHODS IN DESIGN, Van Nostard Reinhold, USA
3. Creswell John W. (1994), RESEARCH DESIGN: QUALITATIVE APPROACHES, Sage Publications.

## **Part-B (700003-B)**

### **Branch Specific Topics**

**Note: Each Unit is of 2 credits. A candidate has to take any *three* units (6 credits)**

#### **ARCHITECTURE:**

**Unit 1 – Architectural Theories – I :** Architectural design, Mathematics and architecture, Parti (Ideas), Pattern language, Proportion (architecture), architectural semiotics, Modernism and deodorization, Anthology, Corporeal architecture, Modular coordination etc.

**Unit 2 – Architecture Theory II:** Master Architects and their approaches to Architecture, Analysis; Phenomenon & Expression of Structures

**Unit 3 – Architecture Education:** History of Architectural education, Pedagogy of Architecture Education, Traditions of Teaching Methods, Introduction to Learning Methods, Transmission of Knowledge in Building, History of Contemporary Architecture Education.

**Unit 4 -Barrier free Architecture:** Introduction and necessity, Design measures in different building types, Public awareness, Legislations of barrier free design.

#### **Reference books:**

1. Collin S.T., John Wilson, Architectural theory Volume-2
2. Mallgrave Harry et.al.(2008) Architectural theory Volume-2: An Anthropology from 1871 to 2005, Blackwell Publication , USA
3. Bronston Byron and Fang Eric (Ed) (1993), The Harvard Architecture Review Vol-9, Rizzoli, Singapore

#### **SUSTAINABLE ARCHITECTURE:**

**Unit 5 – Issues and Principles:** Introduction to the Environmental Architecture, Energy Consumption and environmental issues, Green Building – Background, Concept & initiatives, Democratic movements and the built environment awareness, Introduction to ECBC rules, Energy audits and green building ratings TERI Griha, LEED.

**Unit 6 – Intelligent Buildings:** Building automation protocols, Various AI techniques and their applications in Intelligent Buildings, Use of IT tools for Illumination design and HVAC load calculations, Life Cycle Cost Optimization.

**Unit 7 – Thermal Design Principles:** Understanding Thermal Comfort Criteria and Design Response to climate condition, Energy Building Design, Energy Management System & Intelligent building. Energy consumption and Conservation: Renewable Energy, Energy Efficiency concepts and initiatives.

**Unit 8 – Solar Passive Architecture:** Passive and Active strategies in traditional and contemporary architecture with reference to building types & climate zones.

**Reference books:**

1. Mosaedi-Arian(2003), Sustainable Architecture: High Tech Housing, Carlosvrato & Jospma Minguet
2. Kaushik S.C. et al(1988), Thermal control in Passive Solar Building, IBT Publication
3. Sukhatme Suhas(2003), Solar energy: Energy of Thermal Collection and Storage, Tata Macgraw Hill, New Delhi

**SOCIOLOGY & ARCHITECTURE:**

**Unit 9 – Sociology -** Developments of concepts and principles and its relation with architecture.

**Unit 10 – Anthropology:** Nature and Scope of anthropology its relation with architecture, culture at various levels.

**Unit 11 – Psychology in Architecture:** Introduction and necessity and its application at various building types.

**Unit 12 – Barrier free Design:** Introduction and necessity, Public awareness, Efforts by Government and NGO 's in the field ,Legislations of barrier free design.

**Reference books:**

1. Croney John(1981), Anthropometry, Van Nostrad
2. Haviland William,(1996), Cultural Anthropology, Harcourt Brace College Publication
3. Dubey Saurav (2006) Historical Anthropology, Oxford Unipress

**ARCHITECTURE CONSERVATION:**

**Unit 13– History of Conservation:** Study the origins and the development of the ideas and practices of conservation and restoration of architecture and environment.

**Unit 14 – Conservation Theory & Practices:** introduction to the several disciplines engaged in the conservation of the built environment, most specifically the current practice of architectural restoration and conservation, conservation of the cultural landscape and heritage.

**Unit 15 – Conservation policies and Practices:** Study of legislation abroad of natural and built heritage, Study of legislation in India, Urban planning commission report, 74<sup>th</sup> amendment to the constitution.

**Unit 16 – Conservation Management:** Various aspect of managements like heritage site management, disaster management.

**Reference books:**

1. Ramanathan A.R. et.al.(2007), Protection of Historical Buildings: Contemporary Practices and Thermohygric Behaviour, Anmaya Publications
2. INTACH(2008), Heritage Conservation in Pondicherry, INTACH Publication
3. Owen Oliver et. al.(1998) Natural Resources Conservation: management for Sustainable Future, Prentice Hall

**DIGITAL ARCHITECTURE:**

**Unit 17 – Introduction to Computer Applications:** Basic introduction to the use of computer applications in the field of Architecture and Building Design. Emerging computer technologies, changing cultures of the world due to technological innovation – digital architecture. Visualization.

**Unit 18: Building Automation Systems:** Introduction of various concepts like Automation in acoustical design, illumination, water supply, fire-fighting, HVAC& emergency; various automation equipments

**Unit 19: GIS & Mapping, MIS:** Introduction of Geographic Information Systems and various tools available, uses of GIS in different fields, etc. Introduction to MIS and its application.

**Unit 20: Human Computer Interface:** Introduction: The Human- I/P, O/P channels, Human memory, Thinking, Emotion, Individual differences (diversity), Human psychology.

**Reference books:**

1. Liu Yu Tung(2002), Defining Digital Architecture: 2001 for East International Architecture Design Awards, Publication Birkhauser
2. Liu Yu Tung (2002), Developing Digital Architecture: 2002 FEIDAD Awards, Publication Birkhauser
3. Dix Alan (2005), Human Computer Interaction, Pearson Education

**ADVANCE BUILDING TECHNOLOGY**

**UNIT 21 – Introduction:** Historic and significant contemporary examples, structural concepts; integration with architectural design objectives. Selection criteria for structure systems, with respect to context, trends and energy efficiency.

**UNIT 22 – Concepts of long span structures:** Study, Design and analysis of different suspension systems, construction materials and technology ,recent trends.

**UNIT 23 – High Rise Structures:** Concept of sky scrappers, loading conditions, Study of structural systems, Earthquake resistance methods and global scenario.

**UNIT 24 – Advanced Building Materials:** Contemporary building materials, its applications, different types of buildings, its sustainability ratings; study of energy and cost efficient building materials.

**Reference books:**

1. Daniels Klaus (2003), Advanced Building Systems: A technical Guide for Architects and Engineers, Publication Birkhauser
2. Francis D.K. Ching(2009) Building Structures Illustrated, John Willey and Sons
3. Brantley Reed and Brantley Ruth (1995), Building Materials Technology: Structural Performance and Environmental Impact, Macgraw Hill Inc.

## **URBAN DESIGN**

**UNIT 25** – Significance of Urban Design research, Nature of Urban Design research, translating values into design, Areas of research in Urban Design.

**UNIT 26** – Theories and Principles of Urban Design.

**UNIT 27** – Planning Theory and Practice, Planning and Governance.

**UNIT 28** – Urban form Theories-Figure Ground Theory, Linkage theory and Place Theory Basic elements defining urban form-mass space, paths, edges, districts, nodes and Landmarks, Characteristics of Urban space – Hard space and soft space

**Reference books:**

1. Campbell Scott and Feinstein Susan(1996), Reading in Planning Theory, Oxford Blackwell Publication
2. Parker Simon, (2004), Urban theory and Urban experience Encountering the City, Routledge
3. Jenks Mike and Dempsey Nichola (2005), Future Forms and Designs for Sustainable Cities, Elsevier Publication

## **INTERIOR DESIGN**

**Unit 29** – Design related cognitive learning, Theory and History of Interior Design, Various schools of thought and design emphasis.

**Unit 30** - Study of Interior Design in the Indian & global context, contemporary styles with particular reference to India.

**Unit 31 – Lights and Colours in Interiors:** Colour Theory and its relation to the internal spaces. Lights. Types of lights and its impact on mood and ambiance of an interior and accessories.

**Unit 32 – Furniture, finishes and maintenance:** Characteristics of Early American furniture, Mediterranean and French furniture, Twentieth-Century furniture. Types of flooring, Types of wall treatments and maintenance.

**Reference books:**

1. Rao Paratap(1996), Interior Design: principles and Practices, Standard Book House.
2. Tadao Ando (2000), The Colours of Light, Phaidon Press
3. Taschen Argelika(2009), Indian interiors, Taschen

## **LANDSCAPE DESIGN**

**UNIT 33 – Introduction Landscape Architecture:** History, visual evaluation of landscaped, use of open-scape, spatial characteristics of open space and behavior.

**UNIT 34 – Site planning in Urban Context, Landscape Art and Design Graphics, Planting Design, Study of Plants/trees, ground cover, Indigenous plants/trees. Landscape Construction and bio – diversity parks.**

**UNIT 35 – Ecological aspect of landscape and design, its application such as shelter belts, hill slopes, river fronts, roads and bio esthetic planting.**

**UNIT 36 –Regional Landscape Planning, Landscape Design of Communities, Landscape for historical conservation sites, and Computers in landscape.**

**Reference books:**

1. Land Phair Harlow and Klatt Fred,(2006) Landscape Architecture and Construction, Prentice Hall
2. Simonds John et.al (2006), Landscape Architecture: a Manual of Environmental Planning and Design
3. Marsh William (2007), Landscape Planning: Environmental applications, John Willey & Sons

## **DISASTER MANAGEMENT**

**UNIT 37 –Introduction to disaster management:** Different types of Environmental hazards & Disasters, Introduction to various different mitigation methods.

**UNIT 38 – Types of Disasters and its effect on architecture:** Design aspects and considerations for various types of buildings, especially the residential, congregational and institutional buildings.

**UNIT 39** – Emerging approaches in Disaster Management: Pre- disaster stage (preparedness), Emergency Stage, Post Disaster stage-Rehabilitation, Natural Disaster Reduction & Management,

**UNIT 40** – Disaster Management- An integrated approach for disaster preparedness - mitigation & awareness, Integrated Planning- Contingency management Preparedness, Monitoring Management,

**Reference books:**

1. Charles Janes (2002), Inviting Disaster: Lessons from the Edge of Technology, Harper Business
2. Levinson Jaye & Granot Helim(2002), Transportation Disaster Response handbook, Academy Press
3. Macdonald Roxana (2003), Introduction to Natural and Manmade Disasters and their Effects on Buildings, Architectural Book Publication Co

## **CONSTRUCTION PROJECT AND MANAGEMENT**

**Unit 41 : Essentials of Construction Management:** CPM ,PERT networks, Cost / Resource based networks, scheduling, monitoring and updating, resource planning and allocation, LOB, network crashing, time cost trade off. Computer Application in Construction Management

**Unit 42 : Financial Aspects of Construction Projects and risk management:**

Means of Finance, Working Capital Requirements and Account Statements. Introduction and Principles of risk management, types, origin, risk control, Use of mathematical models, Risk identification, analysis and mitigation of project risks, Role of Insurance in Risk Management.

**Unit 43: Construction Techniques & Equipment management:** Introduction to construction operations, erection work, automation processes and special Equipments for Infrastructure Projects, Material Management: Material planning, accounting and material reconciliation. New trends and construction equipment of future. Planning and selection of equipments, for construction applications. Equipment procurement, purchase, import of equipment, procedural formalities for Import Operations Research in Construction Decision Theory, Game Theory, Linear Programming, Non linear programming

**Unit 44 – Facility Management:** Need of special facility planning, introduction to types and design requirement, behavioural aspects, study of norms and international standards, and management in terms of resource planning.

**Reference books:**

1. Fisk Edward (1997), Construction Project Administration, Prentice Hall
2. Gould Frederick,(2000) Construction Project Management, Prentice Hall
3. Joy P.K. (2008) Handbook of Construction Management, Macmillan Indian Ltd.

## PLANNING

**Unit 45 – Urban Planning & Housing:** Origin ,evolution and contemporary developments in planning., Socio-economic & technological, impacts of growth of population; rural urban migration, Characteristics of the urban environment: Land uses, physical structure The interim and comprehensive plans: Structure Plan, Master Plan, Zonal Development Plan - their purpose and contents, Surveys, analyses and design methods and practices in comprehensive planning, Residential Areas : Neighborhood and Sector Planning, Planning of New Towns in India and abroad. Housing problems: Urbanization and Industrialization, Slums and squatters settlements - problems and possibilities, Residential layouts, housing densities, neighborhood unit, community facilities,

**Unit 46 – Rural Planning:** Sociology, Economics, Evolution of Planning, Rural Development, Research and Quantitative Methods, Government and Governance, Natural Resource Management, Rural Marketing, Rural Housing, Rural communications, Disaster Management, Social Infrastructure Planning, Regional Rural Development, Rural Management and Institutions, Development Finance, Rural Energy, Sustainable Development. Agronomy and Geo techniques, Cooperatives and Rural Management.

**Unit 47 – Infrastructure & Transportation Planning:** Transportation systems; Land use-transportation interrelationships; transportation planning process; Traffic management., Recent innovations in technologies and its probable impacts, Transport policies and evaluation of transportation proposals, Water supply systems, Waste water disposal systems& Solid wastes collection and disposal, Reuse and recycle Techniques, Planning for urban electrical distribution system and communication systems,Economic feasibility tests.

**Unit 48 – Participatory Planning:** Participatory planning theory and context, Participatory methods for situational analysis, Introduction to Objective Oriented Participatory Planning, Analysis of opportunities and problems, Analysis of objectives to be addressed, Preparing a Logical Framework; the intervention logic, Defining indicators, External factors and assumptions, Assessing the comprehensiveness of a Logical Framework, From Logical Framework to budget, The Logical Framework in the project cycle, Prepare and present your personal action plan

**Unit 49 – Environmental Management and Impact Assessment:**

Environmental management, problems and strategies; Future strategies; multidisciplinary environmental strategies, Environmental impact assessment (EIA), Sustainable development (SD), initial environmental examination (IEE), environmental impact statement (EIS), environmental appraisal, environmental audit (EA); Environmental impact factors and areas of consideration, measurement of environmental impact.

**Reference books:**

American society of Civil engineers (2001), Urban Planning Guide, American society of Civil Engineers

Claton Barry Dalal and others (2003), Rural Planning in Developing Countries, Earthscan, India

Charles Correa(1999) Housing Urbanisation, Urban Design Research Institute