

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCED513	Heritage Structures: Preservation, Restoration and Rehabilitation	3	0	0	3

### Course Objective

The primary focus of this course is to explore preservation, restoration and rehabilitation of a wide variety of heritage structures.

### Learning Outcomes

Upon successful completion of this course, the students should be able to:

- comprehend different types of heritage structures based on their physical, environmental, social and economic value.
- study the in-situ tests, material characterization tests, non-destructive, semi-destructive tests and destructive tests on heritage structures.
- explore the preservation, restoration, recreation and rehabilitation techniques of heritage structures.
- understand the concepts of damage quantification and damage prioritization for repair and retrofit of heritage structures.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	<b>Introduction:</b> Introduction to heritage structures, definitions, classification of heritage structures, building taxonomy, heritage precincts, historic preservation, restoration, recreation and rehabilitation techniques of heritage structures.	7L	Understand the preliminary concepts of conservation of heritage structures
2	<b>Vulnerability Assessment:</b> Hazard curve development of the heritage site, In-situ tests, material characterization tests, non-destructive, semi-destructive tests and destructive tests on heritage structures for their vulnerability assessment, development of fragility curves.	7L	Understand the level of decay of the heritage structures
3	<b>Numerical Model Development:</b> Numerical model development based on field survey results, Modeling of material degradation and structural degradation, national and international guidelines for model development of heritage structures, Analysis of heritage building models under diverse loading environment	8L	Understand the principles of model development of heritage structures

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
4	<b>Preservation, Restoration, Recreation and Rehabilitation:</b> Preservation methods, restoration techniques, recreation methods and rehabilitation techniques of heritage structures, technical challenges, national and international guidelines for conservation of heritage structures	8L	Understand the concepts of preservation, restoration, rehabilitation of heritage structures
5	<b>Repair and Retrofit:</b> Identification of weakest structural members, damage quantification, damage state classification, damage prioritization, methods of repair, cost-benefit study, fragility study of heritage structures before and after conservation, Case studies.	12L	Identify the cost-effective solution for conservation of heritage structures
	<b>Total Contact Hours</b>	<b>42L</b>	

**Text Books:**

1. Cullinane, J. J. (2012). Maintaining and Repairing Old and Historic Buildings. Wiley-Blackwell.
2. Feilden, B. M. (2003). Conservation of Historic Buildings. London: Routledge.

**Reference Books:**

1. International Council on Monuments and Sites (2024). "Guidelines for the Analysis, Conservation and Structural Restoration of Architectural Heritage", ISCARSAH, ICOMOS, September 2024, pp.47.
2. CIB Publication 335 (2010). "Guide for the Structural Rehabilitation of Heritage Buildings", June 2010. ISBN: 978-90-6363-066-9.