

# NIRMA UNIVERSITY

## Institute of Architecture and Planning

### Bachelor of Architecture

#### Semester-IV

<b>L</b>	<b>W</b>	<b>S</b>	<b>C</b>
<b>1</b>	<b>2</b>	<b>-</b>	<b>2</b>

<b>Course Code</b>	<b>2AR465</b>
<b>Course Title</b>	<b>Structure IV</b>

#### Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

- Develop conceptual understanding of structural behavior using abstract methods of analysis
- Explain understanding of Determinate and indeterminate structures.
- Develop understanding of Steel structures and its application in design

**Syllabus: 15 weeks (3 hours/week)**

**Total Teaching hours: 45 Hr**

<b>Unit No.</b>	<b>Syllabus: Topic</b>	<b>Sub Topic</b>	<b>Teaching hours:</b>
1	Analysis of indeterminate structures.	<ul style="list-style-type: none"><li>• Introduction to stiffness and distribution factors</li><li>• introduction to moment distribution factors</li><li>• introduction to moment distribution method.</li></ul>	14 hours
2	Indeterminacy of a frame, comparison of post and lintel system and portal frames.	<ul style="list-style-type: none"><li>• Importance of portal frames in resisting horizontal forces.</li></ul>	14 hours
3	Arch as a curved element.	<ul style="list-style-type: none"><li>• Arch in history, efficiency of an arch.</li><li>• Three hinged arch. Simple problems to illustrate the importance of the shape of an arch, rise end conditions and loading.</li></ul>	8 hours
4	Steel as a structural material	<ul style="list-style-type: none"><li>• structural systems in steel with case studies.</li></ul>	9 hours

L= Lecture, W= Workshop, S= Studio, C= Credit

### **Suggested Readings:**

1. Punmia, B. C., Comprehensive Design of Steel Structures, New Delhi, Laxmi Publications Pvt. Ltd., 2012
2. Subramanian, N., Design of Steel Structures, New Delhi, Oxford University Press, 2012
3. Junnarkar, S. B., Mechanics of Structures Vol – 1, Anand, Charotar Publishing House, 2012
4. Pandya, N. C., Steam Tables: Entirely in SI Units including Mollier Chart, Anand, Charotar Publishing House, 2013
5. Steel Design, Newyork, DAAB Publication, 2007
6. Watson, Donald, Time saver Standards for Building Materials and Systems: Design Criteria and Selection Data, New Delhi, Tata McGraw Hill Education Private Limited, 2009
7. IS 456:2000, Indian Standard, Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standards.
8. SP – 16, Design Aids for Reinforced Concrete to IS 456
9. National Building Code of India, 1983
10. IS 1905, Code of Practice for Structural Safety of Buildings.
11. Corkill, P. A., H. L. Puderbaugh, and H. K. Sawyers. Structure and Architectural Design. Iowa City: Sernoll, 1974. Print.
12. Sandaker, Bjørn Normann, and Arne Petter. Eggen. The Structural Basis of Architecture. New York: Whitney Library of Design, 1992. Print.
13. Sarkisian, Mark P. Designing Tall Buildings: Structure as Architecture. New York: Routledge, 2012. Print.
14. Seward, Derek. Understanding Structures: Analysis, Materials, Design. Basingstoke: Palgrave Macmillan, 2003. Print.
15. Cowan, Henry J. Architectural Structures: An Introduction to Structural Mechanics. New York: Elsevier, 1976. Print.
16. Miret, Eduardo Torroja, J. J. Polivka, and Milos Polivka. Philosophy of Structures: English Version by J.J. Polivka and Milos Polivka. Berkeley, CA: U of California, 1962. Print.
17. Salvadori, Mario, and Robert A. Heller. Structure in Architecture: The Building of Buildings. Englewood Cliffs, NJ: Prentice-Hall, 1975. Print.
18. Morgan, William, Daniel Williams, and Frank Durka. Structural Mechanics: A Revision of Structural Mechanics. Harlow: Longman, 1996. Print.
19. Rosenthal, Hans Werner., and Hans Werner. Rosenthal. Structural Decisions: The Basic Principles of Structural Theory, Their Application to the Design of Buildings and Their Influence on Structural Form. London: Chapman & Hall, 1962. Print.