

APPENDIX C

Exercise Problems

The following materials are provided for readers who use this book for individual study or for use as a course text.

For problems that involve numerical computations, answers are given following the problems. However, the reader is advised to attempt to work the problems without referring to the answers except for a check. This procedure will serve better to test the reader's understanding of the work.

Problems are grouped by the chapter to which the work corresponds. Numbering is given for reference purposes only. In many cases the units used are arbitrary, as the relationships and procedures are more significant; in these cases metric units have been omitted for simplicity.

Chapter 1

1. For each of the basic structural materials (wood, steel, concrete, masonry) list both limitations and advantages in their uses for building structures.
2. For each of the limitations listed in Problem 1, describe what measures (if any) can be taken to overcome them.
3. Find a building that is just beginning to be constructed. Visit the site periodically and photograph the progress of the construction. Take pictures from the same locations on successive visits. Organize the pictures to illustrate the growth of the building structure.
4. Find a building that has been built recently. Contact people who were involved in the design and construction. Interview them and write a report on the design and construction of the structure for the building.
5. *The Make and Break.* This assignment involves the actual construction of a structure to perform a specific task. The following is an example; variations are possible.
Design and build a structure to span 4 ft on a simple, horizontal span and to carry a single concentrated load

at the center of the span. End support is limited to vertical reactions only. Materials for the structure are limited to wood and paper. Any means may be used for attachment of parts. The efficiency of the structure on a strength-to-weight basis is critical. The structure will be weighed, load tested to destruction, and a score will be determined using the graph shown.

Demonstration Projects—for assignment or for classroom demonstration

6. *Involvement.* Buckling of a vertical element as related to slenderness.
Procedure. Select a slender linear element (thin strip of wood, plastic, or metal) and find its total compression resistance for various increments of length. Start with a ratio of length to thickness of at least 200 for the longest specimen.
Find. Relation of load capacity to length (or to length-to-thickness ratio).
7. *Involvement.* Bending resistance related to shape.
Procedure. Test the bending resistance of a linear element on a single span when subjected to load at the span center. Test elements of the same type of material and same total cross-sectional area, but with different shapes and different orientations to the load. Both bending strength (load capacity) and stiffness (deflection) may be tested.
Find. Correlation of bending resistance and shape in beams.
8. *Involvement.* Bending and span.
Procedure. Test a linear element for bending as in Problem 7. Test various specimens of the same material and cross section but of increasing span length.
Find. Relation of total load capacity (and/or deflection) to span length.