Chapter 1
Classical Building Materials

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ABSTRACT
Classical building materials are widely used in Civil Engineering projects. Many ancient generations used fire clay and stone as building blocks. The most common building materials today include stones, concrete, plastics, bitumen, glass, wood, metals, bricks, polymers, tiles and heat resisting materials. Current research work has come up with the considerable improvement in the natural characteristics of these materials. Glasses are available in more variety as they were 50 years ago. Similarly, concrete is now available in ultra-high strengths and even blast resistant form. Recently, use of nano-technology has emerged as a rapidly growing field; success of which is also highly dependent on the basic understanding of classical building materials. Advance research work including implementation of nanotechnology may come up with further improvements in the physical and chemical properties of these materials. This chapter would focus on classical materials in detail covering their physical and chemical characteristics, usages as well as economical suitability.

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INTRODUCTION

Construction materials are the backbone of all civil engineering structures. They are being used since prehistoric times. Many ancient generations used fire clay and stone as building blocks. The most common building materials today include stones, concrete, plastics, bitumen, glass, wood, metals, bricks, polymers, tiles and heat resisting materials. Among these materials, stones, various metals and wood are the naturally occurring materials whereas the materials like plastics, cement concrete, bricks and glass etc. are among the famous man-made materials. The modern structures are amalgam of different construction materials; for example, the foundations, beams and slab are constructed using concrete and steel, whereas doors and windows are comprised of wood and various other metals. Similarly, glass is used in doors and windows. Some of the common construction materials are briefly discussed in this chapter.

Stone

Stone is one of the oldest and basic construction materials. Stones are obtained from ground and rocks through various processes. Site from where stones are extracted is known as ‘quarry site’ and the process of extraction is termed as ‘quarrying’. Initially, the stones have irregular shapes and dressing of stones is carried out to bring them in the requisite size and shape. Extraction and dressing of stones requires intense man power, hand tools and machinery. Millions of tones of stone are required every year for the building purposes. It is extensively used in the construction of walls, beams, columns, paving slabs and several other structural components. Many mega structures including dams require huge amount of stones in their construction. Stone is also required to prepare several other construction materials; for example, crushed stone is used in the preparation of concrete. Use of stone in construction is also considered good from sustainability point of view. A house made up of stones catches sunlight in winter but not in summer making it an ideal living place for the whole year. Furthermore, beautiful texture of several stones is accountable for their extensive use as an aesthetic material in buildings.

History

Stone has been used in construction works since Paleolithic times (Smith, 1999). From early days, even before the existence of bricks, stones were used in dwellings, roads and ornamental works (Varghese, 2010). Most of the prehistoric monuments and ancient temples were built using stone (Singh, 2005; Varghese, 2010). Another important example for the substantial use of stone is the construction of the pyramids.
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