engineering, the application of science to the optimum conversion of the resources of nature to the uses of humankind. The field has been defined by the Engineers Council for Professional Development, in the United States, as the creative application of “scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behaviour under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property.” The term *engineering* is sometimes more loosely defined, especially in Great Britain, as the manufacture or assembly of engines, machine tools, and machine parts.The words *engine* and *ingenious* are derived from the same Latin root, *ingenerare*, which means “to create.” The early English verb *engine* meant “to contrive.” Thus, the engines of war were devices such as catapults, floating bridges, and assault towers; their designer was the “engine-er,” or military engineer. The counterpart of the military engineer was the civil engineer, who applied essentially the same knowledge and skills to designing buildings, streets, water supplies, sewage systems, and other projects.Associated with engineering is a great body of special knowledge; preparation for professional practice involves extensive training in the application of that knowledge. Standards of engineering practice are maintained through the efforts of professional societies, usually organized on a national or regional basis, with all members acknowledging a responsibility to the public over and above responsibilities to their employers or to other members of their society.The function of the scientist is to know, while that of the engineer is to do. Scientists add to the store of verified systematized knowledge of the physical world, and engineers bring this knowledge to bear on practical problems. Engineering is based principally on physics, chemistry, and mathematics and their extensions into materials science, solid and fluid mechanics, thermodynamics, transfer and rate processes, and systems analysis.Unlike scientists, engineers are not free to select the problems that interest them. They must solve problems as they arise, and their solutions must satisfy conflicting requirements. Usually, efficiency costs money, safety adds to complexity, and improved performance increases weight. The engineering solution is the optimum solution, the end result that, taking many factors into account, is most desirable. It may be the most reliable within a given weight limit, the simplest that will satisfy certain safety requirements, or the most efficient for a given cost. In many engineering problems the social and environmental costs are significant.Engineers employ two types of natural resources—materials and energy. Materials are useful because of their properties: their strength, ease of fabrication, lightness, or durability; their ability to insulate or conduct; their chemical, electrical, or acoustical properties. Important sources of energy include fossil fuels (coal, petroleum, natural gas), wind, sunlight, falling water, and nuclear fission. Since most resources are limited, engineers must concern themselves with the continual development of new resources as well as the efficient utilization of existing ones.