Management Theory

The engineering function in business and public enterprise.

The enterprise and its environment. Exploration of social, economic, legal, and political interactions. Factory Acts and other legislation; Trade Unions. How the enterprise functions; organization theory. The management process; planning, action, review. Reference will be made to systems of interest to the engineer—forecasting, budgeting, methods of work study, production planning and control, cost control.

TEXTBOOKS

†Brown, J. A. C. *The Social Psychology of Industry*. Pelican.

†Newman, W. H. and Summer, C. E. *The Process of Management*. Prentice-Hall.

Design

Design Method; identification definition, synthesis, analysis, specification, communication. Case histories.

Design Criteria; sources of information (A.S., B.S.S., etc.), materials and processes in relation to design and manufacture, factors of safety (fatigue, creep, etc.), tolerances, aesthetics, ergonomics, cost and costing, reliability.

Design Practice: component and system design examples; involvement in authentic problems of design in conjunction with local industrial concerns.

TEXTBOOK

Marks, L. S. *Mechanical Engineers' Handbook*. McGraw-Hill, International Student Edition.

Project

To complete the final year course of study, seminars, visits to industrial concerns, and a thesis project are included.

The thesis project may be related to the research work of the Mechanical Engineering department.

B.E. DEGREE IN MATERIALS ENGINEERING

The dominant role that materials have played throughout history is evidenced by the designation of eras such as the Stone Age, Bronze Age and Iron Age. Until recently, materials were often developed by empirical methods and many of the materials in use today originated more by chance than by design. The situation is now undergoing a rapid change and it has been claimed that the investigation of the behaviour of materials, in some form or other, now attracts the attention of more scientists and engineers than any other field of work.

The principal force in this change has been the accelerating demands which modern economics and an expanding technology is placing upon the properties of materials. The plastics and electronics industries illustrate the way in which the development of new materials and the control of their structure to give the required engineering properties has led to spectacular growth.

Materials engineering is concerned essentially with the study of the relationships between the structure and the properties of metals, plastics, rubbers and ceramics with the aim of their economic utilization in a wide range of technology. The prime feature of the materials engineer is his ability to apply scientific principles to solving a wide range of technological problems. This work may involve the investigation of the structure of a material by techniques such as electron microscopy or X-ray diffraction, the development and evaluation of new materials for new processes or applications, the investigation of methods for shaping and fabrication, or the selection and evaluation of service performance.

Trained materials engineers participate in all stages of development of a new product or process, from the original basic research in the laboratory, through the development, pilot plant or prototype stages to full scale production. It is for this reason that the subject is equally attractive to members of both sexes.

All engineering students receive service courses in materials science and engineering. The increasing demand for people trained in greater depth in this discipline led to the establishment of a separate department of Materials Engineering and a new undergraduate course is being introduced. This course is outlined below and is concerned with metals, plastics and ceramics rather than concentrating solely on metals as is the case with traditional metallurgy courses. This reflects both a trend which has developed overseas and the growing importance of non-metallic materials.

The first, and much of the second year of the course, consist of subjects which are common to all engineering students and seek to give the materials engineer the basic training in science and engineering necessary for further work in this subject. In the second year, students are also introduced to fundamental aspects of the structure of materials and its relationship to engineering properties. The course subjects in the third and fourth years are materials science and materials engineering in which a wide treatment is given to the properties of metals, plastics, rubbers and ceramics. Mathematics is taught during the first three years of the course. In the final year, special attention is given to topics such as materials design and selection, optimization of properties, mechanical behaviour including shaping and fabrication, and the performance of materials in service. Practical work forms an essential part of most subjects and final year students will carry out a substantial research project in a field of materials (metals, plastics, rubbers or ceramics) of their own choosing.