Industrial engineering syllabus

Industrial engineering examinations

Group A - Compulsory examinations (six required)

17-Ind-A1 Operations Research


Textbooks (most recent edition is recommended):

17-Ind-A2 Analysis and Design of Work

Methods of work analysis, including process analysis, activity charts, person machine charts, operation analysis, micromotion study, fundamental hand motions and film analysis. Principles of motion economy, method study, motion and time study, rating factor, performance factor, allowances and standard data. Pre-determined motion time systems. Work sampling. Wage payment. Motivation and work. Wage incentives. Job enrichment. Software available in the field of analysis and design of work.

Textbooks (most recent edition is recommended):

17-Ind-A3 Facilities Planning

Strategic planning, site selection, product, process, schedule, activity relationship and space requirements, personnel requirements. Developing solutions, including material handling systems and equipment, layout and computer aided layout. Functions, including receiving and shipping, storage and warehousing, production, offices and services. Evaluating solutions, including deterministic and probabilistic models. Selection, implementation, and periodical review of the layout. Safety and relevant environmental considerations

Textbooks (most recent edition is recommended):

17-Ind-A4 Production Management

Production systems, including identification of technical, economic, social, human components and characteristics in the system. Forecasting techniques. Inventories, including role, measuring service level, inventory models and their application in distribution and manufacturing. Aggregate planning of production levels and inventories, including master plan, materials requirements planning (MRP), detailed scheduling and sequencing, assembly line balancing. Information and control
systems for production operations. Project planning and control.

Textbooks (most recent edition is recommended):

- William Stevenson et Claudio Benedetti, *La gestion des opérations*

**17-Ind-A5 Quality Planning, Control, and Assurance**


Textbooks (most recent edition is recommended):


**17-Ind-A6 Systems Simulation**


Textbooks (most recent edition is recommended):


**Group B - Optional examinations (three required)**

**17-Ind-B1 Applied Probability and Statistics**

Basic concepts of probability, transformations of random variables and moment generating functions. Joint and conditional distributions for discrete and continuous random variables, correlation and expectation of a function of several random variables. Sums of random variables, convolutions and central limit theorem. Reliability, maintenance and repair, replacement, inventory, and other applications. Statistical methods: hypothesis testing, T and F tests, and nonparametric tests. Estimation of parameters. Analysis of variance in one way classifications with fixed effects. Linear regression with one or two independent variables. Goodness of fit tests.

Textbooks (most recent edition is recommended):


**17-Ind-B2 Manufacturing Processes**


Textbooks (most recent edition is recommended)
17-Ind-B3 Computer Aided Design and Computer-Assisted Manufacturing

Fundamental concepts in design and manufacturing automation strategies, high volume discrete parts production systems, numerical control of manufacturing systems, computer aided manufacturing (CAM), support systems for manufacturing, group technology, and flexible manufacturing systems. Effect of the use of computerized design aids and numerically or robotically controlled machines.

Textbooks (most recent edition is recommended):


17-Ind-B4 Design of Information Systems

Analysis of existing systems and general design. The role of information for the control and management of integrated production systems. Concepts of information, humans as information processors, nature and value of information for decision-making, economics of sampling, structure of management information systems, hardware, software and control environments of information processing systems, transaction processing systems, data-base systems, organizational structure and management information systems, development and evaluation of management information systems, distributed systems, computer networks, data communications. Data acquisition and transmission. Economic evaluation.

Textbooks (most recent edition is recommended):


17-Ind-B5 Ergonomics

Basic human abilities and characteristics, including vision and hearing. Psychomotor characteristics. Anthropometry: static and dynamic human body dimensions and muscle strength. Environmental factors, including illumination, atmospheric conditions, noise, and vibration. Ergonomic work design, including layout of equipment, manual work aids, design of seating, and person-machine interfaces: instruments, controls, and software. Regulated standards for work, safety and schedules.

Textbooks (most recent edition is recommended):

- Kodak Ergonomics Group, Ergonomic Design for People at Work, Volumes I and II. Van Nostrand Reinhold Co. Ltd.

17-Ind-B6 Workplace Design

System and human engineering analysis, the human as a system component, visual presentation of information, auditory and other sensory forms of information presentation, speech communication. Human machine dynamics, including data entry devices and procedures, design of the multi human machine dynamics. Layout of work places in order to maximize productivity, comfort, health and safety of employees, locating controls and displays, design for maintainability, training system design, training device design, human engineering tests and evaluation.

Textbooks (most recent edition is recommended):


17-Ind-B7 Financial and Managerial Accounting
A study of financial and managerial accounting, including basic accounting concepts, measurements of income and balance sheet presentation. Accounting records and systems, including financial statement analysis, chartered accountant reports, and funds flow. Cost and management accounting, including standard cost and variance analysis, allocation and control of costs. Accounting in business decisions, including budgeting, cash flow forecasting, and planning.

Textbooks (most recent edition is recommended):


17-Ind-B8 Computer Integrated Manufacturing (CIM)


Textbooks (most recent edition is recommended):


17-Ind-B9 Logistics: Transportation Aspects

Introduction to transportation engineering, and transport planning and economics. Modeling of transportation and warehousing problems. Characteristics of transportation systems: rail, highway, airway, waterway, and pipeline. The rural and intercity transport system in Canada; cost and tariffs. Network analysis; the transport planning process. Logistics and competitiveness: evaluation of transportation projects and systems, urban transportation analysis and prediction, traffic studies, highway and intercity capacity, characteristics of traffic flow, traffic control principles, and economics.

Textbooks (most recent edition is recommended):

- No Referenced Textbooks

17-Ind-B10 Workplace Health and Safety


Textbooks (most recent edition is recommended):