

Board of Chemical Engineering

Guidelines and General Instructions on the Conduct of the Chemical Engineering Licensure Examination; Syllabi and Organization/Scope of the Subjects Therein

WHEREAS Sec. 14, Art. II of R.A. No. 318: "The Chemical Engineering Law" states, to wit: "Except as otherwise specifically allowed under the provision of this Act, all applicants for registration for the practice of chemical engineering shall be required to undergo an examination as prescribed in this Act";

WHEREAS Sec. 16 of the supra law provides in part, to wit: "XXX The examination shall cover questions relating to general inorganic, organic, analytic and industrial chemistry, applied mechanic, chemical engineering, and engineering law and ethics: Provided that the relative weight of the chemical engineering subject shall not be less than forty percent";

WHEREAS under Sec. 6(g) of P.D. No. 223, as amended by P.D. No. 657, the Board has the power, function, and responsibility to determine and prepare the contents of the chemical engineering licensure examination;

WHEREAS the Commission has the power to administer and conduct jointly with the Board of Chemical Engineering licensure examinations according to the rules and regulations promulgated by it (Sec. 5, (d) of supra decree and Sec. 19(a) of the Rules and Regulations governing the regulation and practice of Professionals);

WHEREAS the primary objective of the said examination is to test the overall knowledge and proficiency of the applicant for registration for the practice of chemical engineering;

WHEREAS with the rapid advances, enrichment, and dynamic changes in scientific and technical knowledge in chemical engineering, the Board has to inevitably modify the scope of every subject in the examination for the benefit of the examinees; and

WHEREAS after consultation by the Board with the academe and practicing chemical engineers, the Revised Guidelines and General Instructions on the Conduct of the Chemical Engineering Examination (Annex "A") and the Syllabi and Organization or Scope of the subjects therein (Annex "B") were adopted.

NOW, THEREFORE, by virtue of Secs. 3 and 9, Art 1 of R.A. No. 318, the Board hereby Resolved, as it Resolves, to adopt: 1. The Revised Guidelines and Instructions on the Conduct of the Chemical Engineering Licensure Examination (Annex "A"), and 2. The Syllabi and Organization/Scope of the Subjects therein (Annex "B").

FURTHER, RESOLVED, that this Resolution upon its approval by the Commission shall be effective on a date which is fifteen (15) days after the publication thereof in the official Gazette or a newspaper of general circulation and which is three (3) months prior to the examination.

FINALLY, RESOLVED, that this Resolution shall be widely disseminated and circularized to all colleges/schools offering the course/degree of Bachelor of Science in Chemical Engineering and to all concerned.

Done in the City of Manila, this 9th day of August, 1993.

ALBERTO B. MUYOT
Chairman

LYDIA G. TANSINSIN
Member

ZINNIA P. TERUEL
Member

Attested to:

CARLOS G. ALMELOR
Secretary, Regulatory Boards

Approved as part of the Rules and Regulations Governing the Practice of Chemical Engineering:

HERMOGENES P. POBRE
Commissioner

MARIANO A. MENDIETA
Associate Commissioner

ARMANDO C. PASCUAL
Associate Commissioner

Board of Chemical Engineering

Guidelines and General Instructions Chemical Engineering Licensure Examinations

I. Guidelines for Members of the Board of Chemical Engineering

A. The areas covered by the examination shall be within the topics enumerated in the syllabus for the particular subject.

B. The questions and problems in any subject shall be comprehensive and well-balanced within the group of subjects in one day.

C. The questions and problems shall relate to matters which are of general applicability to chemical engineering practice in the Philippines or to general knowledge required of a chemical engineer.

D. Instructions and/or requirements in answering questions or solving problems shall be clearly stated in a concise manner so as not confuse the examinees.

E. The assigned weights of each Test or parts thereof shall be properly indicated. For the first computerization of the licensure examination, the initial weight for every subject shall be: 55% for objective- type questions (only multiple choice) which must be inputted into, selected through and corrected by the computers and 45% for problem-solving, essay type or analogous type which must be selected by the computer and corrected by manual processes under the supervision, direction, and control of the Board Member.

F. The Board Member shall input into the test questions bank at least five-hundred (500) questions for each subject as the starting point which has to be beefed up by at least three hundred (300) questions for every examination to arrive at the optimum three thousand (3000) questions or more. The questions deposited in the bank shall be withdrawable and replenishable with the new ones to meet the updated technological trends or changes in the profession.

G. The questions for deposit in the bank may come from those which the Board Member had formulated or from those which he/she had adopted from the academe with or without modification.

H. No question shall be deposited in the bank unless it has been appraised as to its objectivity, validity, materiality, reliability, and efficaciousness. An expert on Test construction may be consulted to assist the Board Member fine-tune every questions to be deposited to discern if the foregoing constraints or parameters have been met, to

determine if every question is unambiguous or to find out if it is definite and only answerable with one definite correct answer - not with the "best" answer.

I. The questions for each subject to be deposited in the bank shall be classified as to its degree of comprehensibility: easy, average/moderate and difficult; to its level of knowledge (sound, adequate and (fair) and proficiency (competent, adequate, and fair); and its nature: problem-solving, essay, and objective (only multiple choices).

J. The number of questions to be given in the examinations shall be extracted from the bank and randomized so as to produce at least two (2) sets containing different chronological arrangements of questions for printing and distribution to the examinees and so as to prevent the examinees from copying the answers of their seatmates.

K. Security measures shall be implemented to ensure that the computer programs and files are tamperfree. Multiple passwords shall be adopted to that no one is in complete control of, or access to, the computer programs and files. Three (3) responsible key officials shall be designated for this purpose.

L. The correction and rating of test papers as well as the other stages of the results of the examination shall be computerized.

II. General Instructions to Examinees

A. Only the Chemical Engineering Handbook by Perry, et al. any edition SHALL BE ALLOWED TO BE OPENED AND USED AS REFERENCE DURING EACH EXAMINATION DAY inside the examination room. All excess books and printed, handwritten or mimeographed notes, solutions, reviewers, bound or unbound, shall not be permitted inside the room.

B. Only hand-held electronic calculators, WHICH ARE NOT programmable, shall be allowed in the examination room. Personal computers, laptop, and higher types of calculating medium shall not be allowed.

C. Only writing materials [ballpen of only one color, whether blue, blue-black, or black, and two more pencils (No. 1)] for blackening or shading Examinee's Identification/Answer Sheet Set, handcarried food and ladies handbag or clutch bag may be allowed subject to inspection by the examination proctor or guard.

D. One piece of long brown envelope and one mailing envelope with stamp shall be brought by the examinee.

E. Examinees shall not be allowed to leave the examination room, except to go to the comfort room, in which case the examinees shall be accompanied by a proctor or guard. Use of the comfort room shall be limited to only one (1) examinee at a time.

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B. Physics: Mechanics, waves, sound, heat, electricity, magnetism, and light.

C. Engineering Mechanics: Statics and dynamics; free body concepts; equilibrium of coplanar and non-coplanar systems; analysis of frames and trusses; friction; centroids and moments of inertia; motion of particles and rigid bodies; mass, force and acceleration; work and energy; impulse and momentum.

D. Strength of Materials: Axial stress and strain, stresses in torsion and bending, combined stresses, beam deflections, indeterminate beams, and elastic instability.

E. Engineering Economics: Introductory financial accounting; financial mathematics; time value of money; break-even analysis capital investment decision criteria; and engineering-oriented applications.

III. CHEMICAL ENGINEERING

A. Chemical Engineering Calculations: Elementary mass and energy balances; stoichiometry, principles of equilibrium applicable to unit operations and processes;

material and energy balances applicable to industrial process, e.g., gaseous, liquid and solid fuels, sulfur, nitrogen compound, etc.

B. Reaction Kinetics: Principles and applications of chemical kinetics to the design of chemical reactors.

C. Unit Operations: Principles of fluid mechanics; heat, mass and momentum transfer; separation processes; stage-wise operations.

D. Plant Design: Application of physical and chemical principles in the design of industrial plants or parts thereof involving preparation of process flow sheets, mass and energy balances, and equipment design.

E. Chemical Process Industries: Unit processes and operations involved in the inorganic and organic chemical industries.

F. Biochemical Engineering: Aspects of biological sciences, primarily microbiology and biochemistry, which are applicable to process industries

G. Environmental Engineering: Types of pollutants; physical, chemical, and biological processes applicable to pollution control and abatement.

H. Instrumentation and Process Control: Principles and operations of a wide variety of process instruments and the proper selection thereof for practical industrial application.

I. Laws, Contracts, and Ethics: Legal and ethical issues related to the practice of chemical engineering, including intellectual property and environmental laws. Approved.

F. Examination papers shall be submitted in order after each test and arranged chronologically and not folded or creased.

G. Examinee shall secure the instruction sheet on how to accomplish and handle the Examinees Identification/Answer Sheet Set and sample sheets for practice. Those sheets can be secured from the Application Division when the examinee comes back for the room assignment.

H. Room assignments are posted at the PRC premises one or two days before the first day of the examination.

Syllabi

CHEMICAL ENGINEERING LICENSURE EXAMINATION

Scope

The examinees' knowledge and understanding of the concepts, principles, terminology, and the application of these concepts and principles in the solution of problems encountered in each particular subject given in the licensure examinations.

Subjects

I. PHYSICAL AND CHEMICAL PRINCIPLES

A. General Inorganic Chemistry: Matter and energy, theory of atoms and molecules, chemical periodicity, calculation principles in chemical changes, chemical bonding, solutions, chemical equilibrium, chemical kinetics, and nuclear chemistry.

B. Organic Chemistry: Structural characteristics and reaction mechanism of different organic compounds: aliphatic, aromatics, arenas, alcohols, aldehydes, ketones, carboxylic acids, carbohydrates, amino acids, and proteins.

C. Analytical Chemistry: Theory and practice of gravimetric and volumetric methods of analysis and their application methods in the analysis of acids, bases, salts, and minerals.

D. Physical Chemistry: Properties of gases, liquids, solids and solutions; introduction to first and second laws of thermodynamics; thermochemistry; homogeneous and heterogeneous equilibria; transference and conductance of ionized solutions; and electrochemistry.

E. Chemical Engineering Thermodynamics: First and second laws of thermodynamics, P-V-T relationships of fluids, heat effects, thermodynamics of flow

processes, power and refrigeration cycles, phase equilibria, and chemical reaction equilibrium.

II. GENERAL ENGINEERING

A. Mathematics: Algebra, Trigonometry, Analytic Geometry, Differential Calculus, Integral Calculus, Differential Equation, Statistics & Probability Theory