BASIC STUDIES EXAMINATIONS

INTRODUCTION

The Basic Studies Examinations have been structured to ensure that applicants have an adequate foundation in advanced mathematics, basic sciences, and engineering sciences. A full set of Basic Studies Examinations consists of six, three-hour examination papers. Candidates will be assigned examinations based on an assessment of their academic background. Prior to assignment of basic studies examinations, candidates are required to have met PEO’s minimum academic requirements for licensure.

The level expected in these examinations is that of textbooks currently used in first and second year courses in programs accredited by the Canadian Engineering Accreditation Board (CEAB) of the Canadian Council of Professional Engineers. Information on examination scheduling, textbooks, materials provided or required, and whether the examinations are open or closed book will be supplied by PEO’s Examination Centre.

04-BS-1 - Mathematics

Calculus, Vector, and Linear Algebra: Applications involving matrix algebra, determinants, eigenvalues; first and second order linear ordinary differential equations, Laplace transforms. Vector algebra; vector functions and operations; orthogonal curvilinear coordinates; applications of partial derivatives, Lagrange multipliers, multiple integrals, line and surface integrals; integral theorems (Gauss, Green, Stokes). Power series.

Suggested Texts:


04-BS-2 - Probability and Statistics

Concepts of probability, events and populations, probability theorems, concept of a random variable, continuous and discrete random variables, probability distributions, distributions of functions of a random variable, sampling and statistical estimation theory, hypothesis testing, simple regression analysis.

Suggested Text:

04-BS-3 - Statics and Dynamics

Force vectors in two- and three-dimensions, equilibrium of a particle in two- and three-dimensions; moments and couples; equilibrium of rigid bodies in two- and three-dimensions; centroids, centres of gravity; second moment of area, moment of inertia; truss, frame and cable static analysis; friction. Planar kinematics of particles and rigid bodies; planar kinetics of particles and rigid bodies; work and energy, impulse, and momentum of particles and rigid bodies.

Suggested Texts:


04-BS-4 - Electric Circuits and Power

Basic laws, current, voltage, power; DC circuits, network theorems, network analysis; simple transients, AC circuits. Impedance concept, resonance; use and application of phasors and complex algebra in steady-state response; simple magnetic circuits; basic concepts and performance characteristics of transformers; an introduction to diodes and transistors; rectification and filtering; simple logic circuits.

Suggested Text:


04-BS-5 - Advanced Mathematics

Numerical Methods: Use of computers for numerical solution of engineering problems, including techniques involving library subroutines and spreadsheets. Approximations and errors, interpolation, systems of linear and non-linear algebraic equations, curve fitting, numerical integration and differentiation, and ordinary differential equations.

Suggested Texts:

04-BS-6 - Mechanics of Materials

Definitions of normal stress, shearing stress, normal strain, shearing strain; shear force and bending moment diagrams; members subjected to axial loading; members subjected to torsional loading; compound stresses, Mohr's circle; deformation of flexural and torsional members; failure theories; elastic and inelastic strength criteria; columns.

*Suggested Text:


04-BS-7 - Mechanics of Fluids

Fluid characteristics, dimensions and units, flow properties, and fluid properties; the fundamentals of fluid statics, engineering applications of fluid statics; the one-dimensional equations of continuity, momentum, and energy; laminar and turbulent flow, flow separation, drag and lift on immersed objects; wall friction and minor losses in closed conduit flow; flow of incompressible and compressible fluids in pipes; dimensional analysis and similitude; flow measurement methods.

*Suggested Text:


04-BS-8 - Digital Logic Circuits

Boolean algebra, encoders, decoders, shift registers, and asynchronous and synchronous counters together with timing considerations. Design of asynchronous circuits, synchronous sequential circuits, and finite state machines. Karnaugh mapping techniques, and state tables and diagrams. Introduction to programmable logic.

*Suggested Text:


04-BS-9 - Basic Electromagnetics

Introduction to the basic electromagnetic principles upon which electrical engineering is based (laws in both integral and differential form). Classical development of electrostatics and magnetostatics leading to Maxwell's equations. Application of electromagnetic theory to calculation of d-c circuit parameters, study of plane wave transmission in various media.

*Suggested Text:

04-BS-10 - Thermodynamics

Thermodynamic states of simple systems; the laws of thermodynamics; equilibrium, PVT and other thermodynamic diagrams; equation of state; compressibility charts and steam tables; calculation of property changes; enthalpy; applications of thermodynamics, cycles, reversibility; thermodynamics of phase changes, Gibbs phase rule, gas-vapour mixtures.

Suggested Text:


04-BS-11 - Properties of Materials


Suggested Text:


04-BS-12 - Organic Chemistry

Principles of organic chemistry developed around the concepts of structure and functional groups. The main classes of organic compounds. Properties of pure substances. Introduction to molecular structure, bond types, properties, synthesis and reactions, reaction mechanisms, as a means of systematizing organic reactions.

Suggested Texts:

04-BS-13 - Biology

Cellular reproduction, growth, and differentiation; metabolism and bioenergetics of living cells; cell structure and function related to the material properties of plant and animal tissues; introductory microbiology — characteristics and classification of microorganisms; interactions of microorganisms with man in the natural world; kinetics and mathematical models of microbial growth; engineered biological systems such as bio-reactors, bio-instrumentation, and waste treatment systems.

Suggested Texts:


or


And


04-BS-14 - Geology

The structure of the earth, plate tectonics, earthquakes and igneous activity. Minerals and rocks including their formation, identification, basic properties, and classification. Processes of weathering, erosion, transport, and deposition of geological materials and their results of significance to engineering. Occurrence, flow, and quality of groundwater. Introductory aspects of structural geology including faulting, folding, and the overall formation of discontinuities and their effect on the engineering properties of rock masses. Aerial photography and geological maps.

Suggested Texts:


04-BS-15 - Engineering Graphics and Design Process


Suggested Text:


04-BS-16 - Discrete Mathematics


Suggested Texts:

or