**Self-Assessment (SA) – Civil Engineering**

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| **Applicant Name:** | **Karim Ishak Fahmy Guirguis** |
| **Date:** | **22-September-2017** |
| **Institution Attended:** | **Arab Academy For Science, Technology and Maritime Transport** |
| **Years Attended:** | **5** |
| **Year Degree Awarded:** | **2007** |
| **Degree (full name):** | **Construction and Building Engineering** |
| **Degree (abbreviation):** |  |

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| **BASIC STUDIES COMPULSORY SUBJECTS**  **(All required)** | **Course number and Course name on transcripts and page number in course descriptions (if provided)** | **Notes** |
| **04-BS-1 Mathematics (calculus, vector, linear algebra)**: Applications involving matrix algebra, determinants, eigen values; 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. | BA 124 Mathematics ll  BA 223 Mathematics III  BA 224 Mathematics IlII |  |
| **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. | BA 329 Probability and Statistics |  |
| **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. | BA 141 Engineering Mechanics I  BA 142 Engineering Mechanics II |  |
| **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. | CB242 Strength of Materials |  |
| **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. | CB281 Hydraulics for Civil Engineers |  |
| **04-BS-11 Properties of Materials:** Properties of materials for mechanical, thermal and electrical applications. Atomic bonding, solid solutions, crystallisation. Equilibrium phase diagrams, applications to steel and aluminium alloys, heat treatments. Structure and special properties of polymers and ceramic materials. General characteristics of metallic composites, polymeric composites and concrete. Introduction to materials in hostile environments: corrosion, creep at high temperature, refractory materials, subnormal temperature brittle fracture. | CB251 Testing of Materials  CB 531 Technical Installations in Buildings | Hardness of metals and mechanism in metals were included in CB 251 |
| **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. | CB361 Engineering Geology  CB382 Water Resources Engineering |  |
| **BASIC STUDIES OPTIONAL SUBJECTS**  **(minimum of one required)** |  |  |
| **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. | BA113 Physics I  EE 238 Electrical Engineering Fundamentals |  |
| **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. | ME 231 Thermodynamics |  |
| **04-BS-15 Engineering Graphic and Design Process:** Engineering drawing: Orthographic sketching. Standard orthographic projection. Principal views, selection and positioning of views. Visualization. Conventions and practices. First and second auxiliary views. Basic descriptive geometry. Section views, types, hatching conventions. Basic dimensioning requirements. Tolerance for fits and geometry control. Detail drawings and assembly drawings, other drawings and documents used in an engineering organization. Bill of materials. Fasteners and welds. Design process and methods: Project management & teamwork. Requirements and function analysis in design. Conceptual design and testing. Concept evaluation design factors such as: cost, quality, manufacturability, safety, etc. Systems modeling & design detail. | CB221 Construction Engineering Drawings  CB 311 Construction Management I  CB 415 Quantity Surveying, Cost Estimating and Specifications  CB 517 Techniques of Planning, Scheduling and Project Control  CB 413 Quality Control in Construction  CB 416 Construction Management II  IM 112 Industrial Relations  IM 111 Manufacturing Technology  ME 151 Engineering Drawings & Descriptive Geometry | Construction Bidding Were included in CB 415 Quantity Surveying, Cost Estimating and Specifications |
| **CIVIL ENGINEERING EXAMINATIONS**  **GROUP A COMPULSORY EXAMINATIONS (SIX REQUIRED)** |  |  |
| **16-Civ-A1 Elementary Structural Analysis**  Computation of reactions, shearing forces, normal forces, bending moments, and deformations in determinate structures. Influence lines for moving loads. Moment distribution, slope deflection, and energy methods for indeterminate structures without sidesway. | CB 241 Structural Analysis I  CB 343 Structural Analysis II |  |
| **16-Civ-A2 Elementary Structural Design**  Limit states design concepts. Loading due to use and occupancy, snow, wind, and earthquake. Design of tension members, beams, and columns in timber and steel. Design of timber connections and simple welded and bolted connections in steel. Design of determinate reinforced concrete beams and columns. | CB 354 Design of Reinforced Concrete Structures I  CB 444 Design of Metallic Structures |  |
| **16-Civ-A3 Elementary Environmental Engineering**  Population, economic growth, industrialization, urbanization and energy-use, as causes of environmental pollution.  The characteristics of particles, chemistry of solutions and gases, material balances, reaction kinetics, microbiology and ecology, as related to the environment.  The application of environmental principles (technical and non-technical) to: water resource management, water and wastewater treatment, air pollution control, solid waste management, environmental impact assessment, sustainable development and environmental ethics. | CB 532 Environmental & Sanitary Engineering |  |
| **16-Civ-A4 Geotechnical Materials and Analysis**  Materials: Origin of soils, soil identification and classification. Compaction. Permeability, pore water pressure and effective stress. Compressibility and consolidation. Shear strength, stress paths, and critical states. Frost action. Associated laboratory tests.  Analysis: Elastic stress distribution, settlements, times of settlements. Introductory analysis of lateral earth pressures, bearing capacity, and slopes. Seepage; well flow and confined 2-D flow problems. | CB 462 Soil Mechanics |  |
| **16-Civ-A5 Hydraulic Engineering**  Dimensional analysis and hydraulic models. Application of continuity, momentum and energy principles. Steady, closed conduit flow in single pipes and pipe networks. Steady, open-channel flow under uniform and gradually varied conditions, control sections, hydraulic jumps, and energy dissipaters. Hydraulic transients; surges and water hammer in closed conduits, surface waves in open channels. Concepts and principles of turbo machinery, especially centrifugal pumps; similarity relations and cavitation; operation of pump-and-pipe systems. | CB 382 Water Resources Engineering  CB 281 Hydraulics for Civil Engineers |  |
| **16-Civ-A6 Highway Design, Construction, and Maintenance:** Route surveying. Geometric design, including horizontal and vertical alignment and intersections. Properties of road-making materials. Asphalt mix design. Structural design for flexible and concrete pavements. Earthworks and drainage. Pavement management, including condition evaluation, maintenance, and rehabilitation. | CB 472 Transportation EngineeringCB 352 Construction Materials  CB 574 Highway Design and Consbuction. CB 271 Construction Surveying 1  CB 483 lrrigation and Drainage |  |
| **DISCIPLINE SPECIFIC ELECTIVE SUBJECTS**  **(minimum of three required)** |  |  |
| **16-Civ-B1 Advanced Structural Analysis:** Analysis of statically indeterminate structures, including trusses, beams, frames, and arches. Formulation of flexibility (force) and stiffness (displacement), and matrix methods of analysis. | CB 343 Structural Analysis 2 |  |
| **16-Civ-B2 Advanced Structural Design:** Limit states design of steel members and connections in continuous framing; of slabs and footings in reinforced concrete, of pre-stressed concrete members and assemblies; and of composite steel-concrete construction. Influence of creep and shrinkage in concrete construction. | CB 444 Design of Metallic StructuresCB 455 Design of Reinforced Concrete Structures 2 CB251 Testing of Materials |  |
| **16-Civ-B8 Management of Construction:** Size and structure of Canadian design and construction sectors. Methods of project delivery, project management, and organizational form. Site investigation. Estimating and bidding, project planning, scheduling and control, activity planning. Safety practices and regulations, insurance, quality assurance and control. Labour relations. Contract administration. Litigation. | CB 414 Construction Contracts and Law. IM 111 Manufacturing Technology CB 415 Quantity Surveying, Cost Estimating and Specifications.CB 517 Techniques of Planning, Scheduling and Project Control.CB 416 Construction Management 2 CB 413 Quality Control in Construction |  |
| **16-Civ-B12 Risk and Safety in Civil Engineering:** Introductory concepts in fundamentals of uncertainty, risk, risk analysis, safety and decision-making in civil engineering. Risk and safety issues related to planning, design, construction/implementation and operations in the context of environmental, transportation, structures, geotechnical, natural hazards or other civil engineering disciplines. | CB 312 Systems Analysis for Construction Engineers  CB 416 Construction Management 2 |  |
| **16-Civ- B13 Numerical Methods:** Numerical solution of systems of linear and non-linear algebraic equations, eigenvalue problems. Numerical solutions of systems of ordinary and partial differential equations. Initial value and boundary value problems. Finite difference and finite element methods. Numerical stability. | CC 413 Numerical Analysis |  |
| **16-Civ- B14 Open Channel Hydraulics:** Analysis and characteristics of flow in open channels (natural and artificial); channel design considerations including uniform flow (rivers, sewers), flow measuring devices (weirs, flumes), gradually varied flow (backwater and other flow profiles, flood routing), rapidly varied flow (hydraulic jump, spillways), and channel design problems (geometric considerations, scour, channel stabilization, sediment transport). | CB 382 Water Resources Engineering |  |
| **16-Civ- B15 Coastal Engineering:** Basic wave theory, wave measurement, wave statistics, wave record analysis, wave transformation, tides, water levels and storm surges. Design of breakwaters and ocean structures; hydraulic and numerical coastal models. Design of a breakwater, design of a hydraulic model of the breakwater and testing with the hydraulic model to determine breakwater stability. Environmental considerations, coastal zone management, coastal sediment transport and design in the coastal zone. | CB 585 Design and Construction of Coastal Structures |  |
| **16-Civ-B19 Foundation Engineering:** Design of spread footings, rafts and pile foundations according to modern professional practice. Procedures for estimation of bearing capacity and settlements, both immediate and long term, design of structures associated with foundation excavations, drainage and site developments such as braced cuts, retaining walls and anchored sheet pile bulkheads. The role of geological history, penetration testing and simple index properties in prediction of foundation performance. | CB 463 Design and Construction of Earth Structures and Foundations |  |
| **16-Civ-B20 Building Engineering and Services:** Functioning of the building enclosure: behavior of building elements and their sub-assemblies under differential temperature and pressure stresses; fundamentals of acoustics; nature and use of building materials; response of building materials to climatic cycles, radiation, precipitation, heating and cooling; principles of building service systems, including electrical, gas, communications, service-water supply and distribution; introduction to plans, codes, and standards for utility distribution systems.  The range of requirements that drive a building’s design including architecture, engineering, constructability, building codes, and budget. The influence of technology, energy conservation, and environmental constraints on built form. Integration of structural and mechanical systems into building types including residential, office, commercial, and retail. | CB 531 Technical Installations in Buildings AR 411 Architectural Design & Urban Landscape |  |