LICENTIATE (LE) EXAMINATIONS

LICENTIATE (LE)

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
1	LE 201	BUILDING CONSTRUCTION II	Control and coordination of operations on site including the work of sub-contractors and specialist. Safety and welfare of workers on site. Fire prevention, site preparation and drainage, under-pinning, kneeding and shoring. Operational techniques in the construction of foundations, walls, floors, roofing work in steel, timber and reinforced concrete. Space frames and roof decks, roof lighting and ventilation. Timber and reinforced concrete shell construction. Stairs in concrete and timber, lift shaft, transmission ducts, doors and windows. Elimination of fire hazard by construction design.	Candidate should show clear understanding of activities involved in site operations and administration.
2	LE 202	STRENGTH OF MATERIALS II	1) Introduction of the science of strength of materials, S.I units 2) Simple stress system: direct shear and strain ; Hooke's law, Modulus of electricity, strain energy, factor of safety, mechanical testing of materials; Tension and Compression test (steel and concrete only), shear stress, shear strain, modulus of rigidity, lateral strain in Tension and Compression. Poisson's ratio, shear strain energy. 3) Pure Bending: theory of pure bending, 1st and 2nd moments of inertia of plane figure. Sectional module for common section, bending stress, combined bending and direct stress. Middle third rule (core of rectangular section). Middle quarter rule, concept of principal axes and principle moments of inertia. Unsymmetrical bending. Strain energy in bending. 4) Shear Stress in Beam: distribution of vertical shear in beam of rectangular and I-section 5) Deflection of Beams: Strain energy principles and general theory of displacement computation; theorem of Beth and Maxwell, Mohr's and Veneschages (graph multiplication) methods. Area moment methods.	To show basic understanding of building elements and structural theories.

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			6) <u>Struts:</u> slender struts. Effective lengths, slenderness ratio; application of standard.	
3	LE 203	BUILDING SERVICE & MATERIALS II	**The physical environment and factors contributing to health and building comfort** - Climatic condition with due regard to the degree and frequency of variations relating to heating, ventilation, humidity and condensation - Heat and thermal effects - Solar radiation - Vapour transfer - Thermal properties of materials and the effects on moisture content - Insulating materials - Heat loss through windows, heat absorbent glasses. **Sound** - Nature of sound and propagation in solids, liquids and gases. - Review of units of intensity and loudness - Sound transmission through building elements - Control of sound transmission - The principle of sound insulation and acoustics **Fire Resistance** Principles of fire prevention, fire loading, flame spread, fire grading. Principles of heat insulation. Heat losses through building materials. **Lighting** General principles of lighting of buildings by natural and artificial methods. Measurement of illumination. **Electrical** - Effects of an electrical current - Alternating and direct current - Principles of generators, motors and transformers.	Candidates are expected to show clear understanding of the impa of environmental factors i buildings.

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
4	LE 204	LAND SURVEYING II	Principles of surveying. Outcome of surveys (maps, site plans, contour maps). Plane table, chain surveying instruments and procedure. Errors in chainage and correction. Overcoming obstacles. Traversing with chain and compass. Measurement of angles using transit theodolite and total station. Adjustment of theodolites. Use of theodolite for setting out. Calculation of areas and volumes related to site surveying	To exhibit a clear appreciation of the principles of surveying and the use of surveying instruments in building works.
5	LE 205	PRODUCTION ECONOMICS II	Nature and methodology of economic principle and its relationship with other professionals. - Economic problems and economic mechanisms - Economic systems and framework of business organizations - Economic problem and mechanism, resources and capital, population and technological development 1. Forces and demand supply operating in the market economy to determine prices - Calculate the effect of subsidy from the statistical data provided for examination 2. The production equilibrium of firms in the economy - Describe the criteria underlying the nation of perfect competition and monopoly - Calculate the production equilibrium of firm from statistical data provided - Calculate the breakeven point of firm from statistical data provided 3. Appreciate the stages of economic growth with reference to the Nigerian - Describe the measurement and uses of national income and products - Explain the main reason for differences in per capital national income - Describe elementary theory of national income determination.	To demonstrate a clear understanding of basic economic principles, concepts and the tools for economic analysis. Exhibit knowledge of the structure and functions of economic institutions

LICENTIATE (LE)

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
6	LE 206	ESTIMATING II	- Analysis of unit rates for excavation oversite, trenches and pits by hand labour and small capacity tractor. Disposal of spoil. - Plain concrete In foundation and bases - Unit rates for brick-work, block-work in walls, take-work and different bricks - Cost implications of mechanical transportation - Unit rate for analysis for · Various mixes of concrete for pouring concrete · Simple reinforcement · Timber in joints · Reinforced concrete in roofs, beam column · Wall finishes · Standard joinery frames, doors, windows etc	Candidates should show the abi[...] to explain the b[...]rs for costing a[...] estimating of building elements
7	LE 207	BUILDING MATHEMATICS II	**Basic concepts of differential calculus and in application** - Define limits with examples - State and proves basic theorem on limits - Define differential as an incremental notation or a function - Different a function from first principles - Prove the formulae for derivative of functions, function of a function, products and quotient of functions - Differentiate simple algebraic, trigonometric, logarithmic, exponential, hyperbolic parametric, inverse and implicit functions. - Derive second derivative of a function - Apply differential to simple engineering and technological problems - Explain the rate of change of a function - Explain the condition for turning point of a function - Distinguish between maximum and minimum value of a function	Candidates are expected [...] understand basic mathematic[...] concepts in relation to buildi[...] practices.

LICENTIATE (LE)

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			- Determine the tangent to a curve - Determine the normal to a curve **ENGINEERING PROBLEMS** - Define integration as the reverse of differentiation - Explain integration as a limit of summation of a function - Distinguish between definite and indefinite integrals - Determine the indefinite and definite integrals - Determine the definite integral of a function - Integrate algebraic, logarithm, trigonometric and exponential simple functions - List possible methods of integration - Integrate algebraic and trigonometric function by the substitution method - Calculate length of arc, area under a curve, area between two curves, volume of revolution, center of gravity, centre of surface area, second moment and moment of inertia **FIRST ORDER HOMOGENOUS LINEAR ORDINARY EQUATIONS WITH CONSTANT COEFFICIENTS AS APPLIED TO SIMPLE ENGINEERING PROBLEMS** - Define first order differential equation - List order, degree, general solution, boundary or initial conditions and particular solution of differential equations - List examples of various types of first order differential equations - Define first order homogenous differential equations - List the methods of solving differential equations by separable variables - Identify differential equations reducible to the homogenous form - Explain exact differential equations - Solve exact differential equations, e.g show that $(3x^2+y \cos x)dx+(\sin x-4y^3)dy=0$ is an exact differential equation ; find its general solution. - Define integrating factors - Determine the solution of differential equations using integrating factors - Define linear differential equation of the first order	

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			BASIC CONCEPTS OF PARTIAL DIFFERENTIAL AND APPLY SAME - Define partial differentiation - List and explain the uses of partial derivatives - Solve problems on partial differentiation, e.g. f (x, y) =x2+y2 = 2xy, find dy/dx, dx/dy Apply partial differentiation to engineering problems **MATRICES AND DETERMINANTS** - Define Matrix - Define the special matrices B zero matrix, identify matrix B square matrix, skew symmetric - State example for each of the matrices mentioned above - State the laws of addition and multiplication of matrices - Illustrate the commutative, associative and distributive nature of the laws states above - Explain the transpose of a matrix - Determine a determinant for 2by2 and 3by2 matrices - Define the minors and cofactors of a determinant - Explain the method of evaluating determinants - States and prove the theorem A two rows or two columns of a matrix are identical, then the value of its determinant is zero - State and prove the theorem A if two rows or two columns are interchanged, the sign of the value of its determinants is changed - State and prove the theorem A if any one row or any one column of a matrix is multiplied by the constant , the determinant itself is multiplied by the constant - State and prove the theorem A if a constant times the element of a row or column are added to the corresponding element of any other row or column, the value of the determinant itself is multiplied by the constant.	

LICENTIATE (LE)

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
8	LE 208	BUILDING SERVICES II	- States examples of each of the theorems mentioned above - Define the adjoint of a matrix - Apply Crammer's rule in solving simultaneous linear equation - Apply linear transformation in solving simultaneous linear equations **SOIL AND WASTE INSTALLATION** - Sanitary appliances in buildings domestic, institutional and commercial buildings **DRAINAGE** Underground and surface water drainage systems of buildings and small estates - The use of pumps in drainage - Principles of sewage treatment - Construction of sewage treatment system for small groups of buildings - Separate and combined system of drainage **DISPOSAL** Disposal of domestic and commercial refuse and sewage disposal. Inspection chamber, manholes, soak away, septic tanks, cesspools - Principles of drainage - Principles of soil and waste disposal systems	Candidates are expected to show good knowledge of mechanical installations, applications and waste disposal concepts.

TECHNICIAN (TE) EXAMINATIONS

GRADE: TECHNICIAN (TE)

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
1	TE 101	BUILDING CONSTRUCTION I	Site Inspection, Site clearing, Layout of temporary services – access roads, stores, accommodation and setting out. Bearing capacity of soil types. Excavation and earthwork support to simple trenches in various types of soil. Strip foundation. Reinforced concrete ground foundation. Reinforced concrete ground beams. Building on sloping sites. Damp proof courses.	Candidate should show clear understanding of activities involved in site operations and administration.
2	TE 102	STRUCTURAL MECHANICS I	1. Introduction to Structural Mechanics a. Structural Forms: impulse, work, energy and power. Newton's law of motion, conservation of linear momentum and energy, angular velocity and acceleration. 2. **STATICS** **FORCES:** co-planar forces, equilibrium of concurrent forces: Resolution of co-planar forces: Equilibrium of parallel forces: Moments, centroid. 3. **BENDING MOMENTS AND SHEAR FORCES** Bending Moments and Shear Forces on a simple structure. Simple beams and cantilever. Relationship between moment and shear force. Analytical and Graphical Method of determining Shear Force and Bending Moment. Statically Determinate Beams. Structural stability. 4. **FRAMED STRUCTURES** Geometric stability and determinacy of trusses. Forces in trusses. Graphical and analytical methods of determination of forces in trusses. 5. **HYDROSTATICS** Hydrostatic pressure: resultants on curved surfaces. Centre of pressure. Introduction to Bernoulli principle, flow of water in pipes and channels, the venturimeter .	To show basic understanding of building elements and structural mechanics.

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
3	TE 103	BUILDING SCIENCE & MATERIALS I	**CONCRETE** - Factors affecting the strength and workability - Mix design methods - Plasters, mortars and rendering **TIMBER** - Properties - Seasoning and preservation - Dry rot, wet rot – defects in timber and treatment **BITUMEN** - Tar and asphalt types - Properties and uses/applications **PROPERTIES OF MATTER** Physical and chemical properties of Building materials **MATERIALS** - Properties and uses of cement, lime and plaster - Testing of concrete mixes - Factors affecting strength and durability of concrete Structure of Solids, Liquids and gases Durability of materials in various environments **METALS** - Structure - Effects of alloying - Elastic properties - Fracture, creep and fatigue - Simple corrosion theory **THERMOPLASTICS** - Structure and mechanical properties - Thermosetting polymers, structure, properties, colloids - Timber and timber products, - Paints, asphalts and ceramics	Candidates are expected to show a clear understanding of the propert of materials and their applications building construction.

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			CERAMICS - Simple Sheet structures - Clay and clay products - Moisture and thermal movement of fired clay products, strength and porosity - Weathering and decay of porous materials - Types of frost action and salt crystallization - Types of glass used in Buildings **CEMENTATIONS IN MATERIALS** - Portland and allied cements - Setting action and chemical reactions - Physical nature of set materials, moisture movements, volume changes on setting and hardening - Effects of curing, heat evolution, effects of additives	
4	TE 104	LAND SURVEYING I	Principles of Leveling by optical Methods. Description and use of Abney level, Cowley level, Dumpy level and Quick set level. Collimation and Rise and Fall method of Leveling Profile and Reciprocal Leveling.	Candidates are expected to show basic understanding of the application and principles of simple surveying instruments.
5	TE 105	PRODUCTION ECONOMICS I	**DEFINITION AND SCOPE OF ECONOMICS** - Explain economics and the nature of Economics - Define scarcity, want, choice and scale of preference - Examine opportunity cost concept **BASIC TOOLS FOR ECONOMIC ANALYSIS** - Explain types of statistics – concepts tables, charts and graphs - Calculation of measures of central tendency, mean, median and mode - Calculate measures of dispersion range, mean deviation, standard deviation, variance and coefficient of variation - Calculation of simple linear equation	To demonstrate a clear understanding of basic economic principles, concepts and the tools for economic analysis. Exhibit knowledge of the structure, functions and types of business organizations

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			DEMAND AND SUPPLY Definitions, Laws, schedule types, demand/supply curves and factors that affect demand and supply. **PRICE SYSTEM AND RESOURCE ALTERATION** - Definition of price systems - Functions of price system - Merits and demerits **PRODUCTION** - Meaning, purpose and types of production - Factors of production - Functions of primary, secondary and tertiary production - Division of Labour - Merits and demerits, Limitation **COST CONCEPT** Meaning of cost, types of cost Application of the various types of cost **REVENUE** Explanation of the terms: Total revenue, average revenue, Marginal revenue and the relationship between the three concepts **MARKETS** - Definition - Types of markets, perfect ,imperfect, monopoly etc **PERFECT AND IMPERFECT COMPETITION** Meaning, features, characteristics, types, merits and demerits **LABOUR MARKET** Definition, labour force, employment and unemployment	

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			BUSINESS ORGANISATION - Meaning of Business Organisation - Types of business organization, Aim/purpose, sources of finance, sole proprietorship, characteristics, merits and demerits - Partnership types, characteristic methods of establishment and merits - Limited Liability Company-types, characteristics and methods of establishment - Stocks and Shares Definition, types, advantages and disadvantages **PUBLIC CORPORATION** Definition, purpose, nature, reasons for existence, advantages and disadvantages **INFLATION AND DEFLATION** Definition, types, causes, control and effects of inflation **PUBLIC FINANCE** - The meaning of Public Finance and fiscal policy - Objectives of public finance - Sources of government finance - Structure of government expenditure - Taxation, types of taxes **BUDGET** Meaning, reason, types and effects of each type of Budget	
6	TE 106	ESTIMATING I	1.1 Define the terms: All in labour rate 1.2 State the information obtained from the following source. a. Technical reports including site visits b. Bill of quantities c. Standard form of Building contract conditions d. Architect's drawing, schedules & specifications e. Codes of practice relating to estimating f. Labour and Plant	To show good understanding of basic principles and concepts of estimation of building works.

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			BASIC PRINCIPLES & SCOPE OF ESTIMATING Explain techniques of approximate estimating by the use of the following methods: a. Storey enclosure b. Unit c. Superficial d. Rough qualities e. Cube **CONSTITUENT PARTS OF UNIT-RATES** Explain the elements of prime cost under: a. Material elements - delivery, unloading, storing, handling and waste. b. Plant elements (applied to unit rate): hiring with associated charges and running cost, Builders own plant including capital cost, depreciation, insurance licenses and running cost. c. Labour element – Builders own labour, all in labour rate, labour only subcontractors Compare rates based on different analysis e.g. a. Builders own labour V – subcontractors labour b. Builders Own plant V – Hired plant c. Builders own unit rate V – subcontractors or suppliers' all-in quotations e.g. plumbing & finishes **DISTINGUISH BETWEEN PRIME COST, OVERHEAD COST AN PROFITS** Define: a. Prime cost b. Project overheads c. General Overheads	

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOM
7	TE 107	MATHEMATICS FOR BUILDING I	d. Special risks & consideration **USE RATE ANALYSIS TO PRICE ITEMS IN BILL OF QUANTITIES** Build up unit rate for: a. Surface excavation, trenches and isolated holes, earth work support to simple excavations, basement excavation, disposal of spoil hardcore b. Concrete to strip foundations, ground floor slab, including formwork and reinforcement c. Walls in common and facing brick and block work Roofing and roofing materials **SYSTEM INTERMEDIATE UNIT** Difference between S.I and imperial units of Linear Measurement: Conversions of S.I units and vice-versa **STANDARD FORMS** Decimal places and significant figures, rounding up figures and expressing numbers in standard forms **RATIO AND PROPORTIONS** Relationship between ratio and proportion. Direct and inverse ratios and proportions **VARIATION** Direct, inverse and partial variations Joint variations **PERCENTAGES, PROFIT AND LOSS** Percentages, profit and loss calculation, commercial arithmetic including profit and loss. Small decimal fraction. Application of profit and loss to commerce generally **SIMPLE INTEREST** Simple Interest calculations	Candidates are expected to understand basic mathematica concepts in relation to building practices.

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			INDICES Apply the laws of indices in simplification and calculation ARITHMETIC AND GEOMETRIC PROGRESSION Sequences and series. Difference between AP and GP. Nth terms of AP and GP. Sum of AP and GP. **SURDS** Simplification of Retimalization of simple surds **ALGEBRAIC PROCESSES** Solve basic arithmetic operation with algebraic symbols **SIMPLE EQUATIONS** Solve problems involving simple equations **ALGEBRAIC PROCESS** Linear, simultaneous equation, solve linear simultaneous equations in two variables **ALGEBRAIC EXPRESSIONS** - Solve simple equations involving fractions - Simple quadratic equations **GRAPHS OF ALGEBRAIC EXPRESSIONS** Solve simultaneous linear and quadratic equations graphically Solve quadratic equations using appropriate methods Construct quadratic equation with given roots Solve word problems **PLANE FIGURES** identify plane figures by their properties perimeter and areas of plane and geometric plane figures **AREAS OF REGULAR AND IRREGULAR SHAPES** Calculation of areas of regular and irregular shapes **LINES AND SHAPES** Identify the different types of lines and angles	

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
8	TE 108	BUILDING SERVICES I	**CONSTRUCTION** Simple geometric construction **SIMILAR TRIANGLES** Apply the properties of similar triangle to solve exercises in plane geometrical figures and solids **CONGRUENT TRIANGLES** Apply the condition of congruency to solve exercises in triangles **CIRCLES – ARCS, RADIUS, DIAMETER, SECTOR AND SEGMENT** Calculate lengths and areas related to the circle **AREAS AND VOLUMES OF SOLIDS** Calculate the surface areas and volumes of solid figures **INTRODUCTORY STATISTICS** - Practical presentation of data using histogram, bar-chart, line- graphical pie-chart - Interpretation of graphs and charts Frequency distribution of equal and unequal forms - Identification of mode, mean and median of graphical data **PROBABILITY** - Define probability terms - Solve problems on theoretical and experimental probabilities **TRIGONOMETRY** Apply sine and cosine rules to solve problems **WATER SUPPLY** - Water sources, reservoirs and water distribution - Water distribution to buildings - Water treatment - Cold water supply and storage - Direct and indirect water supply - Merits and demerits of each system of water supply	Candidates are expected to understand the principles of water supply applications in building.

S/No	COURSE CODE	COURSE TITLE	COURSE CONTENT	EXPECTED OUTCOME
			HOT WATER SUPPLY - Supply for domestic, public and commercial buildings **HEATING** - Types and choice of systems including warm air and electrical embodied systems - Methods of heating by steam high or low pressure - Boiler house and chimney requirements - Modern space heating appliances ventilation - Natural and Mechanical ventilating systems and equipment - Stack effects of flue and ventilation openings - Air cleaning services - Air-conditioning and control systems for heating and ventilation - Refrigeration	

APPENDIX A
TEMPLATE FOR TECHNICAL REPORT WRITING

Preliminary pages

i.   Title page
ii.   Declaration page
iii.   Certification by Mentor (Registered Builder)
iv.   Acknowledgement
v.   Table of content
vi.   Abstract

Main Report
Chapter 1 - INTRODUCTION

Chapter 2 - PRACTICAL WORK EXPERIENCE, (THIS SHOULD BE BY PROJECTS AND   INCLUDE ANY PROFESSIONAL WORKSHOPS, SEMINARS, CONFERENCE ATTENDED AND LESSONS LEARNT)

Chapter 3 -KNOWLEDGE OUTCOME AND ACCOMPLISHMENTS

Chapter 4 - CONCLUSION, CHALLENGES AND RECOMMENDATION

References

Appendices including; CV, Certificates, MCPDs, Receipts and SOFT COPY. (CD or Flash)

Assessment

- Technical Accuracy/ Neatness   - 5   Marks
- Content   - 15   Marks
  Total Marks   20

NOTE: The Technical report must be supervised by an eligible CORBON registered member