Detail Syllabus of 1st Year Even Semester B.Sc. Engineering

GCE1201 (Glass and Ceramic Raw Materials)
Lecture: 3 hrs/week. No. of Credit: 3.00
Introduction: The range and scope of various natural minerals and inorganic non-metallic materials to be used as raw materials for glass and ceramic products, General ideas about the characterization of natural and synthetic materials.

Natural Raw Materials:

Non Plastic Materials: Polymorphic forms of SiO_2 and their transformations, Different natural forms of SiO_2 - their properties, industrial importance and uses. Properties, Composition, effect of heat, Uses and availability of Pyrophillite, Talc, Sillimanite minerals, Zircon sand etc.
Plastic Raw Materials: Definition and Classification of clay, Composition and properties viz: particle shape and size, Deflocculation and Flocculation, Plasticity, CEC, General ideas, Occurrences, Important properties and uses of China clay, Ball clay, Fire clay, Bentonites etc.
Fluxing Agents: Nepheline Syenite, Bone ash, Feldspar, Wollastonite - their compositions, properties, availability and uses in ceramic industries.
Refractory Raw Materials: General idea, Composition, Properties effect of heat, availability and uses of Bauxite family, Magnesite, Dolomite, Chromite, Graphite, Limestone.
Coloring Agents: Red oxide, Manganese oxide, Cobalt oxide, Calcium oxide.

Synthetically Prepared Raw Materials:

Introduction: General idea, Classification, Importance of synthetic raw materials.
Methods of Powder Preparation: General idea, Different routes of powder preparation techniques.
Structure, Properties and Application: Al_2O_3, Mullite, Mag-Al Spinel, ZrO_2, TiO_2, Ba-titanate, Ferrite, ZnO, Dolomite, MgO, Carbides and Nitrides, Fumed silica, Silicic acid sol, Silica gel.
Other Synthetic Materials: Sea water magnesia, B/F slag, Fly ash, Red mud, Rice husk ash etc.
Synthetic Abrasives: General ideas, Properties and Uses.

Math1213 (Engineering Math-II)
Lecture: 3 hrs/week, No. of Credit: 3.00
Differential Equation: Basic concept and ideas of differential equation, Solution of first order differential equations by various methods, Solution of general linear equations of second and higher order with constant coefficient, Applications.
Partial Differential Equations: Introduction, First order linear and nonlinear equations, Standard forms, Solutions of heat and Wave equations (One-dimensional).
Matrices: Vector space, Subspace, Linearly dependent and independent vectors, Linear combination, Basis, Span, Matrix algebra, Rank of matrices, Elementary transformation, Eigensystems, Solution of linear algebraic and differential equations by matrix method, Diagonalization and Arthogonalized transformation, Quadratic form, Positive, Semi-positive, Negative and Seminegative matrices.
Vector Analysis: Vector geometry, Addition and Multiplication of vectors.
Vector Calculus: Differentiation and Integration of vectors with respect to a parameter, Line integration, Surface integration and Volume integration, Gradient, Divergence and curl of a vector, and its physical significance, Conservative systems, Green's theorem, Gauss's divergence theorem and Stokes' theorem and their applications in some physical problems.

Phy1209 (Physics-II)

Lecture: 3hrs/week, No. of Credit: 3.00

Physical Optics: Theories of light, Huygen's principle and construction, Superposition of light waves, Interference, Diffraction, Polarization.

Geometrical Optics: Reflection and Refraction of spherical surfaces, Lenses, Combination of Lenses, Equivalent Lens and equivalent focal length. Defects of images formed by lenses, Monochromatic and Chromatic aberrations, Spherical aberrations, Astigmatism, Coma, Distortion and curvature of images, Achromatism and Achromatic combination of lenses.

Oscillations: Simple Harmonic Motion, Combination of Simple Harmonic Motion and Lissajous' figures, Vibrating systems, Un-damped and Damped Oscillations, Forced Oscillations, Resonance.

Waves: Transverse waves, Longitudinal waves, Wave motion, Superposition of waves, Reflection of waves, Progressive and Stationary waves.

Sound Waves: Sources of sound, Transmitting medium, Speed of sound, Beats, Doppler effect, Sonic booms, Audible Ultrasonic, Infrasonic and Supersonic waves.

Chem1209 (Chemistry-II)

Lecture: 3 hrs/week, No. of Credit: 3.00

Solution: Types of solutions, Moods of expressing composition of solutions, Henry's law, Ideal and non-ideal solutions, Solution of gas and liquids, Boiling point diagrams of binary liquid, Solution of solids in liquid, Properties of dilute solutions.

Phase Rule: Definitions of various terms, Degree of freedom, Reduction phase rule, Clapeyron equation, Applications of phase rule.

Thermo-chemistry: Laws of thermo-chemistry, Heat of reaction, Heat of solution, Heat of combustion, Heat of formation and Heat of neutralization, Experimental determination of thermal changes during chemical reactions.

Chemical Kinetics: Rates of Reaction, Order, Molecularity, Integrated laws, Reactions approaching equilibrium, Temperature dependence of reaction rates, Consecutive elementary reactions, Collision theory, Activated complex theory, Steady state approximation, Parallel reactions, Kinetics of heterogeneous reactions.

Electrochemistry: Electrolysis, Theories of electrolytic dissociation, Conductivity and mobility of ions, Transport number, Ionic equilibrium, Ostwalds' dilution law, Electro-chemical cell, Corrosion.

Colloids: Classification of colloids, Methods of preparation and purification of colloidal solutions, Properties and Applications of colloids, Associated colloids, Gels, Emulsions.

Hum1211 (Sociology and Accounting)

Lecture: 3 hrs/week, No. of Credit: 3.00

Sociology:

Scope of Sociology: Micro and Macro sociology, Some basic concepts.

Society: Social evolution and techniques of production, Oriental and occidental societies.

Industrial revolution: The growth of capitalism and Social consequences, Population and World resources.

Leadership: Types, Functions, Techniques, Social Power.

Culture and Civilization: Concept of culture, Civilization**,** Cultural change and Social structure of Bangladesh.

Urbanization: Family-urbanization and Industrialization, Urban Ecology, Co-operative and Socialist movements.

Rural Sociology: Features of village community in Bangladesh, Social mobility.

Accounting:

Introduction: The accounting equation, Accounts, transaction, Double entry mechanism.
Accounting Procedure: Financial statements.
Cost in General: Objectives and Classifications.
Overhead Costing: Cost sheet under job costing, Operation costing and Process costing.
Marginal Costing: Tools and techniques, Cost volume profit analysis.
Relevant Costing: Analysis the profitability within the firm.
Guideline for Decision-making: Short run decisions, Long run planning and control, Capital budgeting.

GCE1202 (Glass and Ceramic Raw Materials Lab)
Sessional: 3hrs/week, No. of Credit: 1.50
Determination of percent Moisture and Grit content of clays, Determination of Water of Plasticity and Atterberg's Plasticity of clays, Measurement of Drying Shrinkage and Dry Strength of clays, Measurement of Firing Shrinkage and Firing color of clays, Determination of % free iron content in Feldspar & Quartz powder, Determination of B.D. of fired sample, Determination of Vitrification range of clays, Determination of Water Absorption of Fired Ceramic Bodies, Determination of particle size by Andersen Pipette method.

Phy1210 (Physics-II Sessional)
Sessional: 1.5 hrs/week, No. of Credit: 0.75
Sessional based on **Phy1209**

Chem1210 (Chemistry-II Sessional)
Sessional: 1.5 hrs/week, No. of Credit: 0.75
Volumetric estimation of Fe, Cu, Ca, Cl, etc. Heat of solution and Neutralization. Thermochemical measurements.

MES1210 (Workshop Practice)
Sessional: 3hrs/week, No. of Credit: 1.50
Acquaintance with hand & machine tools used in woodworking, Identification of soft, hard & modified woods, Sawing, Planning & Chiseling practice, Mortising, Tenoning dovetail, Pin & socket making, Half lap, Cross joint, Rabbet joint, Dado joint & Miter joint, Making simple wood patterns that will be used in foundry shop.
Preparation of molding sand mixtures, Core making, Melting and casting of ferrous and nonferrous materials, Study the effect of foundry variables on structure and properties of castings.