Detail Syllabus of 4th Year Odd Semester B.Sc. Engineering

GCE4703 (Glass Manufacturing)
Lecture: 3 hrs/week, No. of Credit: 3.00
Raw Materials Preparation: Silica sand beneficiation- Silica sand screening, Sand washing & iron separation, Preparation of dolomite, limestone, feldspar, coke powder and other raw materials, Raw materials handling.
Glass Melting: Introduction and General nature, Glass batch considerations, Steps in glass melting, Processes occurring within the melter.
Types of Melters: Pot and tank furnace, Heat Recovery—Regenerative and Recuperative furnaces, Construction materials/refractories, Electric Boosting and All-Electric melting, Oxygen for combustion, Furnaces for specific applications.
Glass Forming: Blowing, Pressing, Casting, Centrifugal forming, Rod and Tube Drawing, Sheet Drawing, Rolling, The Float process, Fritting, Spheres, Marbles and Microspheres.
Annealing and Tempering: Development of permanent stresses in glass, Stress profiles in a symmetrically cooled glass plate during annealing and tempering, Standards of annealing, Annealing practices, Standards of temper, Commercial tempering practices, Limitations of thermal tempering, Chemical strengthening of glass.
Finishing Operations: Frosting and designing of glass, Cutting, Packing and stacking of glass, Manufacturing tolerances and glass design, Quality control of glass.
Inspection: Possible defects, Inspection system, Training of inspection, Maintenance of inspection equipments.

GCE4705 (Advanced Ceramics-I)
Lecture: 3 hrs/week, No. of Credit: 3.00
Different Advanced Ceramics: Carbides: Boron carbide, Silicon carbide, Titanium carbide, Zirconium carbide, Hafnium carbide & Uranium carbide. Nitrides: Boron, Silicon & Aluminium nitrides. Silicides: Molybdenum disilicide, Borides, Sialon, Graphites, Cermets & Composites.
Ceramics used in advanced applications: Nuclear energy, Magneto-hydrodynamic generation, Gas turbine blades, Abrasives, Aerospace, IC engines, Heat exchangers, Wear applications.
Ceramics for Medical and Scientific products: Tissue attachment mechanism, Bio-active materials, Nearly inert crystalline ceramics, Porous ceramics, Bioactive glass and glass ceramics, Calcium phosphate ceramics, Carbon base implant materials, Ceramics for dental applications.
Ceramics for optical applications: CRT and TV picture tubes, Telecommunication and related uses, Information display, Laser, Fiber optics, Electromagnetic windows.
Ceramics in Electrochemical cells: Sodium sulphate cell (with β- alumina), Electrical ceramics for fuel cell and high energy batteries.

GCE4723 (Ceramic Coatings and Glazing)
Lecture: 3 hrs/week, No. of Credit: 3.00
Coating: Advantages of ceramic coating w.r.t. organic coatings. Different types of ceramic coatings: i) Thermal barrier coating, ii) High emissivity refractory coating, Characteristics of different types of ceramic coating. Raw Materials, Composition of different types of coating, Processing of the raw materials, Frit preparation, Milling, Preparation of enamel slip. Metal surface preparation before coating. Wetting of metal by glass, Different theories of adherence. Theory of opacity and treatment of pacifying agents. Application of coatings on metal surfaces. Drying and firing of coating. Different coating defects and remedial measures. Special types of coatings, Quality control.

Glazing: Purpose & advantages of glazing, Raw glazes, Different type of glazes, Different colouring oxides, Glaze defects, Glazing techniques, Testing of glazes, Quality control.

IPE4733 (Financial Management)
Lecture: 3 hrs/week, No. of Credit: 3.00
Introduction: Financial Management, Financial Planning and Capitalization- definitions, objectives, changing roles and functions, Financial Decision.
Capital Budgeting: Nature of investment decision, Importance of capital budgeting, The Capital. Budgeting process - Investment criterion, Pay-back period, Accounting, ROR (Rate of Return) method. Discounting Cash flow method, Net - present value method, IRR (Internal Rate of Return) method. The benefit-cost ratio method.
Management of Working Capital: Various concepts, Elements, Classification, Financing and importance of working capital, Investment analysis, Cash flow determination, Cost of capital, Capital budgeting methods.
Budgeting Control Technique: Concepts of Budget, Budgeting and budgetary control, Objectives, Functions, Uses, Advantages, Limitations, Master budget and report.
Cost-Volume-Profit Analysis : Classification of costs, Allocation, Apportionment and absorption, Cost centers, Different costing systems, Cost analysis for managerial decisions, Meaning of Linear CVP analysis, Objectives, Assumptions, Break - Even analysis, Determining the Break-Even point profit, Volume graph profit, Volume ratios margin of Safety.
Financial Control: Posting of Ledgers and preparation of Trial Balance; Preparation of Balance sheet and Profit and Loss accounts; Controlling other departments by Financial Accounting (A practical approach).

GCE4704 (Glass Manufacturing Sessional)
Sessional: 3 hrs/week, No. of Credit: 1.50
Sessional based on **GCE4703**

GCE4724 (Ceramic Coatings Sessional)
Sessional: 1.5 hrs/week, No. of Credit: 0.75
Sessional based on **GCE4723**

GCE4708 (Failure Analysis Sessional)
Sessional: 1.5 hrs/week, No. of Credit: 0.75
Determination of rate of corrosion, Identification of type of corrosion, Advantages and Disadvantages of different corrosion testing methods, Design of Cathodic and Anodic protection, Coatings like electroplating etc., Corroded surface analysis by XRD, EPMA, XPS, AES and ESCA, Failure Analysis of Glass and Ceramic due to other factors.

GCE4700 (Project and Thesis)
Sessional: 3 hrs/week, No. of Credit: 1.50