DEPARTMENT OF CHEMISTRY

ST. JOSEPH'S COLLEGE OPEN ELECTIVE -I SEMESTER

INDUSTRIAL AND MATERIAL CHEMISTRY

Number of Theory Credits	Number of lecture hours/ semester	Number of practical Credits	Number of practical hours/ semesters
3	42	-	42

Industrial materials **10 hours**

Refractories: properties, classification, determination of PCE values.

Abrasives: Classification, applications, Moh's hardness scale and manufacture.

Glass: properties, types, composition, raw materials, varieties of glass borosilicates, optical, safety glass, fire and bullet proof glasses composition and uses.

Cement: raw materials, manufacture of portland cement, setting of cement.

Ceramics: Raw materials and their role, varieties of clay, production of ceramic ware, glazing, insulators.

Steel: Alloy steels-influence of Si, Mn, Cr, Ni, Ti and W on the properties of steel. Ferro alloys-Uses and production of ferrochrome, ferromanganese and ferrosilicon. Heat treatment of steel-hardening, tempering, annealing, case hardening - carbiding and nitriding. Steel industries in India.

Contribution to the 'Economy of India by Chemical Industries'.

Metallurgy **4 hours**

Occurrence of metals in nature, minerals and ores, general principles of metallurgy, concentration of the ore – gravity separation, froth floatation process, refining of metals – electrolytic, vapour phase and zone refining methods.

Petroleum and petrochemicals **4 hours**

Origin of petroleum, composition, refining of petroleum, fractional distillation, octane number, petrol, diesel, kerosene, naptha, lubricants, LPG, synthetic petrol, applications of petrochemicals.

Nanotechnology **8 hours**

Definition, nano domain, properties and synthesis of nanomaterials, types of nanoparticles. Applications of nanomaterials i) medicine-gold sol, Antibacterial materials-AgO ii) ~~photo-voltaic cell (in solar cells)~~ iii) self-cleaning glasses-ZnO, SnO, TiO v) Catalytic material vi) Super capacitors, Fabrics and electronics.

Water chemistry **3 hours**

Principles and applications of aqueous chemistry, water quality parameters and standards, hardness of water. Uses of zeolites in removal of hardness of water

Fuels **5 hours**

Characteristics, classification, calorific value, coal varieties, reserves in India, coke, gaseous fuels, biofuels-types, advantages, bioethanol, biodiesel, biogas- preparation and applications.

Explosives and propellants **3 hours**

Explosives – classification, requirements of an explosives and applications.
Propellants - characteristics, classification and applications.

Pigments, paints and dyes **5 Hours**

Pigments, types of pigments-natural pigments, synthetic pigments, reactive pigments.
Paints-definition, classification of paints, constituents of paints, requirements of a good paint, manufacture of paints, Purpose of painting.
Dyes, sensation of colors, chromophore, auxochrome, classification of dyes-acid dyes, base dyes, direct dyes, mordant dyes, vat dyes. Dyeing, factors affecting dyeing process.
Varnishes: Types and constituents.

References

E. Stocchi: Industrial chemistry, Vol 1, Ellis Horwood Ltd. UK

B.K. Sharma and H. Gaur, Industrial Chemistry, Goel Publishing House, Meerut.

B.K. Sharma, Industrial Chemistry including chemical engineering, Goel Publishing House, Meerut.