OPEN ELECTIVE-9 **The Science of Colours**

Semester	I
Paper code	CHOE-IX
Paper title	The science of colours
Number of teaching hours per week	3
Total number of teaching hours per semester	42
Number of credits	3

1. LIGHT FANTASTIC: THE BASICS OF COLOURS **22 h**

The concept of colour; transparent, translucent, opaque objects. Electromagnetic spectrum, primary, secondary colours. Additive and subtractive colour mixing, the science of colour perception- structure of eye, rods and cones, types of cone cells based on sensitivity to wavelength. Prism refraction - separating colours. Two categories of colour production-pigmentary colour, structural colour.

Activity: Ishihara colour test

Theory of colour-the colour wheel, colour values, colour schemes, understanding colour, meaning of saturation and value of colour, colour harmonies (monochromatic, analogous, triadic, complementary, split complementary, tetratic).

Case Study: 1. Zoom into a blue morpho butterfly- study of photonic effects in natural nanostructures. 2. Marketing colour psychology. 3. Photonic cosmetics. 4. Study on neoimpressionism. 5. Pointillisim- points to pixels. 6. Anticounterfeiting and security.

2. CLINGY CHEMICALS-THE ONES THAT ARE BORN TO DYE **20 h**

Chemistry of colourants:

Dyes: History of dyes, classification of dyes based on source (natural and synthetic dyes). Disadvantage of natural dyes. Properties of dyes. Uses of indigotin, alizarin, phenolphthalein, rosaniline and malachite green dyes.

Dyeing process of textiles. levelness, conditions to attain levelness.

Case study: 1) Leather dye pollution in Vellore district, Tamil Nadu. 2) Water usage and waste water characteristics of *batik* production by natural dyes application.

Pigments: History of pigments, classification of pigments (organic and inorganic), properties of pigments. Study of pigments- prussian blue, mauveine, melanin, YlnMn Blue.

Differences between dyes and pigments.

Food colours: natural and synthetic, FD&C designation of synthetic food colours, synthetic food colourant: application as food additives suggested by FSSA (India), effect on health.

Activity: Oil, water and food colouring- fun science experiment.

Holi hues: Organic and chemical source of black, blue, green, red, purple colours along with their potential risks.

Activity: DIY- organic natural powder colours

Case study: *aurora borealis spelling need to check*- The northern lights, *aurora australis*- The southern lights.

References:

1. Colour Chemistry, Robert M Christine, 2nd Edition, The Royal Society of Chemistry (2015).
2. https://colormax.org/color-blind-test/
3. https://madamescientist.com/2014/09/07/the-art-of-seurat-science-and-pointillism/
4. https://www.slideshare.net/chemtradeasia/the-chemistry-of-paint
5. https://www.slideshare.net/bejoybj/chemistry-of-inks-dyes-and-pigments
6. https://www.slideshare.net/WASSAN14CH18/dyes-and-pigments

Formative Assessment (Internal assessment) Theory	
Assessment Occasion/ type	**Weightage in Marks**
Continuous evaluation and class test	20
Seminars/Class work	10
Assignments/Discussions	10
Total	40