B.Sc. 6th Semester (Honours) Examination, 2022 (CBCS)

Subject: Chemistry

Paper: DSE-4

(Inorganic materials of industrial importance)

Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Answer any *five* questions: 2 × 5 = 10

(a) Why do batteries go dead, but fuel cells do not?

(b) Name the electrolyte used in Li-ion battery.

(c) What is muriate of potash?

(d) Write two important properties of emulsion paints.

(e) Mention the importance of NPK fertilizer as the essential plant nutrient.

(f) Give two examples of a Vat dye.

(g) What is the specific energy range in Watt-hour per kg in a Li-ion battery?

(h) Write down the reason(s) for the optimisation of partial pressure of CO to obtain a good yield in hydroformylation reaction.

2. Answer any *two* questions: 5× 2 = 10

(a) Write a catalytic cycle for the methyl acetate production *via* the Monsanto acetic acid synthesis. In this synthesis, iodine is the cocatalyst but not other halide – explain. 3+2 = 5

(b) What do you understand by controlled-release fertilizer? Write in detail about bio-fertilizers. 2+3 = 5

(c) Give electron counts for all the species postulated to be involved in the catalytic cycle for hydroformylation. 5

(d) How are mordant dyes applied to fabrics? Distinguish between acidic and basic dyes? 2.5 + 2.5 = 5

3. Answer any *two* questions: 10× 2 = 20

(a) What is the function of a phase transfer catalyst? Describe the pathway of its function. Discuss the application of zeolites as catalysts.

Justify or criticize the statement "In preparation of the stereoregular polymer, Ziegler-Natta Catalyst (heterogeneous catalyst) is a better choice than Zeigler catalyst (homogeneous catalyst)". 2.5+2.5+2+3 =10

(b) Explain the methods of production of calcium ammonium nitrate. What is PPC? Write a brief account of the setting and hardening of the cement. 3+2+5 =10

(c) Write a short note on classification, properties, and applications of ceramics.

What are the desirable qualities of an electric battery? List three important points typically considered for selecting a battery to explore a new application.

5+2.5+2.5 =10

(d) Write advantages and disadvantages of a lithium-ion battery. Which pigment is used to inhibit corrosion of iron and steel objects?

Write down antifouling agents used to prepare marine paints? Why do azo dyes not impart fast colours to fabrics? 3+2+2+3 =10