B.Sc. 6th Semester (Honours) Examination, 2024 (CBCS)

Subject : Chemistry

Course : 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) What do you mean by mixed fertilizers? Cite an example.

(b) Give two examples of non-ferrous alloys. Mention their uses.

(c) What is the composition of photosensitive glass?

(d) How is lead azide used as explosive?

(e) What is muriate of potash?

(f) Define phase transfer catalyst with suitable example.

(g) Give two examples of Vat dye.

(h) Mention two important parameters behind the choice of a battery.

2. Answer *any two* questions: 5×2=10

(a) (i) State the components of lithium-ion battery.

(ii) Write down anodic and cathodic reactions involved in lithium-ion battery. 3+2

(b) (i) Mention the steps for the production of glazed porcelain. Write the raw materials, used for this purpose.

(ii) What are the differences between High Strength Low Alloy Steel (HSLA) and Plain Carbon Steel? 3+2

(c) (i) What do you understand about controlled-release fertilizer?

(ii) Mention different additives that are used in a paint. Which purposes do they serve? 2+3

(d) (i) Write down the compositions of safety glass, soda-lime glass and lead glass.

(ii) Distinguish between borosilicate and fluorosilicate glass. 3+2

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

(a) (i) Mention the advantages and disadvantages of homogeneous and heterogeneous catalyst.

(ii) "In preparation of the stereoregular polymer, Ziegler-Natta catalyst (heterogeneous catalyst) is a better choice than Ziegler catalyst (homogeneous catalyst)"— Justify the statement.

(iii) In Wacker process, $[PtCl_4]^{2-}$ (catalyst) can not substitute $[PdCl_4]^{2-}$. —Explain. 4+3+3

(b) (i) Write a brief account on 'setting and hardening' of cement.

(ii) What is glass annealing? Mention its necessity.

(iii) Write down with equations, the working principles of Pb-acid battery. 4+3+3

(c) (i) Explain the following term related to the compositions of a paint:

(I) pigment (II) binder (III) plasticizer

(ii) "Olefin insertion into the Co-H bond and CO insertion into the Co–R bond are the two key steps of hydroformylation reaction." — Comment.

(iii) Mention one application of high technology ceramics. (2+2+2)+3+1

(d) (i) Draw the flowchart diagram for the manufacture of urea indicating the major unit operations.

(ii) How does a solar cell work?

(iii) Mention different types of explosives with one example for each.

(iv) Indicate major precautions needed for the storage of explosives. 3+2+3+2