

2022

CHEMISTRY — HONOURS

Paper : DSE-B-1

(Inorganic Materials of Industrial Importance)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer *question no. 1* (compulsory) and
any eight questions from the rest (*question nos. 2 to 13*).

1. Answer the following questions (*any ten*) : 1×10
- (a) What are the components used in the manufacture of soda lime glass?
 - (b) Write the full form of PVCN with respect to paints.
 - (c) A fertilizer is labelled as 15-15-10. What does this designation mean?
 - (d) What is the cathode component in a lithium-ion battery?
 - (e) What is an complete fertilizer?
 - (f) Mention one application of high technology ceramics.
 - (g) Name one catalyst promoter for a catalytic reaction.
 - (h) Which compound is responsible for setting of Portland cement?
 - (i) How do you prepare lead azide? Show chemical reactions only.
 - (j) Which components are necessary for the manufacture of heat retardant paint?
 - (k) What is the role of a 'depolarizer' in a dry cell battery?
 - (l) How a ZSM-5 catalyst regenerated for olefin oligomerization?
2. (a) What do you mean by superphosphate of lime? State the reactions occurring during the production of superphosphate. 3+2
- (b) Write briefly how triple superphosphate is manufactured. 3+2
3. (a) Mention the major steps of porcelain manufacturing. 3+2
- (b) What do you mean by vitrification and devitrification of glass? 3+2
4. (a) What is heterogeneous catalysis? Elucidate with an example. 3+2
- (b) How is PETN prepared? 3+2

Please Turn Over

5. (a) State three characteristics to choose a battery.
(b) What is meant by 'turn-over number'? 3+2
6. (a) Show the elementary catalytic steps for homogeneous catalysis using an example of a reaction of your choice.
(b) What are zeolites? 3+2
7. (a) Discuss with a flowchart diagram the steps involved in the manufacture of steel.
(b) Name the two most common heat treatment practices used for surface hardening of manufactured steel components. 3+2
8. (a) State the important properties of optical glass. Write the chemical reactions involved in the photochromatic action.
(b) Write two uses of carbon fibre. 3+2
9. (a) Draw the flowchart diagram for the manufacture of urea indicating the major unit operations.
(b) What do you mean by slag cement mentioning its use? 3+2
10. (a) Explain the following terms related to the compositions of paint :
(i) pigment
(ii) binder
(iii) plasticizer.
(b) What do you mean by oil-length? Mention one use of varnish. 3+2
11. (a) How does a solar cell work?
(b) What is Alkaline Fuel Cell (AFC)? 3+2
12. (a) Mention the steps in the production of glazed porcelain. State the raw materials involved.
(b) What is the difference between High Strength Low Alloy steel (HSLA) and Plain Carbon steel? 3+2
13. (a) State the components of a lithium-ion polymer battery. Write the anodic and cathodic reactions involved in a lithium-ion battery.
(b) What are enamels? 3+2
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