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3 (Sem-6/CBCS) CHE HE 2

2025

CHEMISTRY

(Honours Elective)

Paper : CHE-HE-6026

(Industrial Chemicals and Environment)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : $1 \times 7 = 7$
- (a) Asphyxiation is caused by the lack of
- (i) N_2
 - (ii) O_2
 - (iii) NH_3
 - (iv) CO_2
- (b) Eutrophication is caused by the discharge of which of the following
- (i) Phosphates
 - (ii) Nitrates

(iii) Sulphates

(iv) Chlorides

(c) O_3 layer depletion is mainly due to the presence of

(i) O_2

(ii) CO_2

(iii) N_2

(iv) Chlorofluorocarbon

(d) In nitrogen cycle, ammonium ion (NH_4^+) is converted to nitrites by nitrification caused by bacteria such as _____.

(e) What is BOD ?

(f) Which of the following is a type of non-renewable resource ?

(i) Nuclear energy

(ii) Solar energy

(iii) Geothermal energy

(iv) Hydrogen and fuel cell

(g) What is meant by smelting ?

2. Answer the following questions : $2 \times 4 = 8$

(a) What is particulate matter ? How does PM_{10} affect our health ?

(b) Write two uses of borax.

(c) How is bleaching powder manufactured ? Give the chemical reaction.

(d) Write the differences between calcination and roasting.

3. Answer **any three** questions : $5 \times 3 = 15$

(a) Describe nitrogen cycle.

(b) Describe the manufacture of caustic soda by Nelson Diaphragm cell process. Give the necessary chemical reactions.

(c) How is photochemical smog formed ? Describe **any three** remedial measures of photochemical smog. $2+3=5$

(d) What is dissolved oxygen (D.O.) ? Describe the process of measurement of DO content in water with necessary chemical reactions. $1+4=5$

(e) What is bio-catalyst ? Discuss the advantages of bio-catalysts. $1+4=5$

4. Answer the following questions : (**any three**) $10 \times 3 = 30$

(a) What do you mean by depletion of ozone layer ? Write the photochemistry involved in the depletion of ozone layer by oxides of nitrogen, CFC and halogen. $1+3+3+3=10$

(b) How sulphuric acid is manufactured by contact process ? Give necessary chemical reactions. Describe the health hazards associated with sulphuric acid. How sulphuric acid should be stored ?
 $3+3+2+2=10$

(c) What are the main sources of SO_2 ? Discuss the effects of SO_2 on living organisms and vegetations. Describe the method of estimation of SO_2 .
 $1+3+6=10$

(d) What are the characteristics of non-conventional sources of energy ? Describe biomass as energy source. Why biomass is considered as an attractive energy source ? $2+2+6=10$

(e) What are industrial effluents ? Explain the effluents treatment technique of leather industry. Describe about the industrial waste management.
 $2+3+5=10$

(f) (i) What is the purest form of iron ? Write all the chemical reactions of smelting of haematite ore in a blast furnace.
 $1+4=5$

(ii) Describe the Bessemer process for the manufacture of steel. 5