2025

(Nov–Dec)

FYUP : 5th Semester Examination

MAJOR

CHEMISTRY

(Chemistry—V)

CHE–302

(Part–A : Theory)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

(Inorganic)

(*Marks* : 19)

1. *(a)* What is superphosphate of lime? Write down the preparation of super-phosphate from phosphatic rock along with chemical equations. 1+1½=2½

(b) What is the role of gypsum? Give the chemical reaction for the formation of sulphoaluminate. 1+1=2

(c) What are mixed fertilizers? Give example. 1½

(d) Mention the major constituents of paints. Write the chemical formulae of the following pigments : 1+½+½=2

(i) Prussian blue

(ii) Lithopone

OR

2. (a) What are the raw materials required for the manufacture of cement? 2

(b) Discuss the manufacture of ammonia by Haber process and manufacture of urea from ammonia. 1½+1½=3

(c) Write down the chemical reactions involved in the preparation of chrome yellow. 2

(d) Name one naturally occurring yellow pigment. 1

3. (a) What are the major water pollutants? Mention the physical characteristic of wastewater. 1+2=3

(b) What are the particle sizes of heavy particulate matters and nano-particulate matters? 1

(c) What are fluorocarbons? How does it effect the ozone layer? Give the chemical equations for the depletion of ozone layer. 1+1+1=3

(d) Discuss the role of phosphates in eutrophication. 2

(e) Write a short note on menace of plastic pollution. 2

OR

4. (a) Explain why CO_2 is called a greenhouse gas. How does it effect global warming? What are the methods to control CO_2 emission? 1+1+1=3

(b) Write down stepwise chemical reactions involved in the formation of nitric acid rain. 2

(c) Mention the toxic effect of lead compounds. 2

(d) How does surfactant alkyl benzene sulfonate (ABS) interfere with waste treatment processes? 2

(e) What is meant by BOD or biological oxygen demand? How does eutrophication effect BOD? 1+1=2

UNIT—II

(Organic)

(*Marks* : 19)

5. *(a)* Define the terms 'antipyretic' and 'antibacterial'. Give one example each. 3

(b) Give a method for the preparation of Paracetamol. 2

(c) Draw the structure of barbituric acid. 1

OR

6. *(a)* Write the synthesis and use of Aspirin. 3

(b) Define the following terms and give one example each : 3

(i) Analgesic

(ii) Tranquillizer

7. *(a)* Give one example each with structure for azo dye and triphenylmethane dye. 2

(b) Define the term 'chromophore'. Indicate the chromophoric group in the structure of phenolphthalein. 2

(c) Give a method of preparation of methyl orange. Explain by giving appropriate structure how it acts as an indicator in acid-base titration. 2+1=3

OR

8. *(a)* Give a method of synthesis of phenalphthalein. Write the structure of phenalphthalein in neutral and alkaline solutions. 3

(b) Mention the types of dyes based on their structures. 2

(c) Draw the structures of Bismarck brown and malachite green. 2

9. *(a)* What are drying and non-drying oils? 2

(b) What is the advantage of detergents over soaps? 2

(c) Give one general method of preparation of soaps from fats. 1

(d) Write a note on RM value. 1

OR

10. *(a)* What are iodine value and saponification value of fats and oils? 2

(b) Discuss the cleansing action of soaps. 2

(c) Why are animal fats solid and vegetable oils liquid? 1

(d) How will you convert oil into a fat? 1

UNIT—III

(Physical)

(*Marks* : 18)

11. *(a)* State the phase rule. Apply it to water system at its triple point. 1+1=2

(b) Draw and explain the phase diagram of sulphur. Highlight the features of different allotropic forms. 4

(c) How many phases are present in the following systems? 2

(i) A mixture of N_2, H_2 and O_2

(ii) A saturated solution of sodium chloride in contact with excess solid NaCl

(d) Define upper critical solution temperature. Describe a system having an upper critical solution temperature. 1+2=3

(e) Derive the Nernst distribution law. How can it be applied in solvent extraction? 3+2=5

(f) Write a note on steam distillation. 2

OR

12. *(a)* Describe the phase diagram of $KI-H_2O$ system. 3

(b) Define the following : 1×3=3

(i) Phase

(ii) Components

(iii) Degrees of freedom

(c) What is incongruent melting point? Give one example of a system having incongruent melting point. 1+1=2

(d) Explain azeotropes with suitable examples. 3

(e) Discuss the phase diagram of CO_2 system. 3

(f) What are partially miscible liquids? Discuss the partial miscibility of nicotine-water system with a labelled diagram. 1+3=4

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