TDC Even Semester Exam., 2019

CHEMISTRY

(Pass)

(2nd Semester)

Course No. : CHMP–201

(Inorganic, Organic and Physical Chemistry)

Full Marks : 35
Pass Marks : 12

Time : 2 hours

The figures in the margin indicate full marks for the questions

GROUP—A

(Inorganic Chemistry)

(*Marks* : 12)

Answer **one** question from each Unit

UNIT—I

1. Define electronegativity. Give a short account of Pauling's scale of electronegativity. 1+2=3

2. Write briefly about 'diagonal relationship' and 'ionic radius'. 1½+1½=3

UNIT—II

3. *(a)* Explain Cady and Elsey's concept of an acid and a base. 2

(b) Ammonium chloride behaves as an acid in liquid ammonia. Explain. 1

4. *(a)* "The alkali metal solutions in liquid ammonia are blue in colour and the solutions are highly paramagnetic." Comment. 2

(b) Give one example of solvolysis reaction in liquid sulphur dioxide. 1

UNIT—III

5. How is hydroxylamine prepared? Give one reaction each to show its oxidizing and reducing properties. 1+2=3

6. *(a)* Why is diamond hard whereas graphite is soft? 1

(b) Discuss the structure of fullerene (C_{60}). 2

UNIT—IV

7. *(a)* What is the main cause of 'lanthanide contraction'? 1

(b) Discuss its effects on the properties of lanthanides. 2

8. *(a)* Give the name of two lanthanides. What are the oxidation states exhibited by them? 1+1=2

(b) Name the lanthanide which is radioactive. 1

GROUP—B

(Organic Chemistry)

(*Marks* : 11)

Answer **one** question from each Unit

UNIT—I

9. *(a)* Name two products of carbonization of coal and mention their usefulness. 1

(b) Write a note on synthetic petrol. 1

10. *(a)* Explain the term 'cracking'. 1

(b) How did coal originate? 1

UNIT—II

11. *(a)* Discuss the mechanism of nitration of benzene. 2

(b) Explain the directive influence of —NH_2 group. 1

12. *(a)* Write the mechanism of sulphonation of benzene. 2

(b) Explain activation-deactivation in electrophilic aromatic substitution taking suitable examples. 1

UNIT—III

13. *(a)* Explain hydroboration reaction and point out its utilities. 1+1=2

(b) Write a brief note on Fries rearrangement. 1

14. *(a)* Write with reaction how you can synthesize 3° alcohol using Grignard reagent. 1

(b) Write the test to show that phenols are more acidic than alcohols. Give necessary explanations. 1+1=2

UNIT—IV

15. *(a)* Which of the following is more reactive towards nucleophilic addition reaction and why? 1

Butanal, Butanone

(b) Write the mechanism of Claisen condensation. 2

16. *(a)* Write one general method of synthesis of aldehydes. 1

(b) Write the mechanism of addition of $NaHSO_3$ to carbonyl compounds. 2

GROUP—C

(Physical Chemistry)

(*Marks* : 12)

Answer **one** question from each Unit

UNIT—I

17. *(a)* What do you mean by a state function? 1

(b) What are extensive properties? Give two examples. 1+1=2

18. *(a)* Write the differences between the following : 1×2=2

(i) Reversible and Irreversible processes

(ii) Closed and Isolated systems

(b) Which of the following is/are intensive property? 1

Mass; Enthalpy; Density; Surface tension, Volume.

UNIT—II

19. *(a)* State the first law of thermodynamics. 1

(b) For n moles of an ideal gas, derive a relation between u and H. 2

20. What is Joule-Thomson effect? Show that it is an isoenthalpic process. 1+2=3

UNIT—III

21. State phase rule and explain the terms. 3

22. Explain the phase diagram of a one-component system. 3

UNIT—IV

23. *(a)* What do you mean by colligative properties of a dilute solution? 1

(b) State Raoult's law of elevation of boiling point. 2

24. *(a)* What is osmotic pressure? 1

(b) Calculate the osmotic pressure of a 2% glucose solution at 0 °C. 2

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