

2024/TDC (CBCS)/EVEN/SEM/
CHMDSC/GEC-401T/305

TDC (CBCS) Even Semester Exam., 2024

CHEMISTRY

(4th Semester)

Course No. : CHMDSC/GEC-401T

(Transition Metals, Coordination Chemistry,
States of Matter and Chemical Kinetics)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks
for the questions

UNIT—I

1. Answer any *three* of the following questions :

1×3=3

(a) Calculate the magnetic moment of Mn^{2+} ion.

(b) Name one compound of transition metal that acts as catalyst.

24J/908

(Turn Over)



(2)

- (c) Identify the lanthanides with $Z = 58$ and $Z = 71$.
- (d) Write down the general electronic configuration of lanthanides.
2. Answer any one of the following questions : 2
- (a) Give a brief account on Latimer diagram.
- (b) Discuss lanthanide contraction.
3. Answer any one of the following questions : 5
- (a) Discuss the trend of atomic radii of first transition series. Write a short account on colour and magnetic properties of transition elements. $2+3=5$
- (b) What are lanthanides? Discuss the ion exchange method of separation of lanthanides. $2+3=5$

UNIT—II

4. Answer any three of the following questions : $1 \times 3 = 3$
- (a) Write down the IUPAC name of $\text{Na}_2[\text{CrO}_4]$.

24J/908

(Continued)

(3)

- (b) Draw the structure of facial isomers with suitable example.
- (c) Draw the crystal field splitting diagram of d^7 system in octahedral low-spin complex.
- (d) Draw the structure of EDTA^{4-} ion.
5. Answer any one of the following questions : 2
- (a) Give one example of each of ionization and linkage isomerism.
- (b) Define ambidentate ligand with example.
6. Answer any one of the following questions : 5
- (a) Discuss the bonding, structure and magnetic properties of $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{CoF}_6]^{3-}$ using VBT. $2\frac{1}{2} + 2\frac{1}{2} = 5$
- (b) Calculate the CFSE for d^6 system considering weak and strong field ligand. Give a brief account of Jahn-Teller distortion. $3 + 2 = 5$

24J/908

(Turn Over)

(4)

UNIT—III

7. Answer any *three* of the following questions :
1×3=3

- (a) Define mean free path.
- (b) Write down the van der Waals' equation for n moles of gas.
- (c) What is the ratio of three different types of molecular velocities?
- (d) Define coefficient of viscosity.

8. Answer any *one* of the following questions : 2

- (a) Discuss the two faulty postulate of kinetic molecular theory.
- (b) What are the units and significance of van der Waals' constants, a and b ?

9. Answer any *one* of the following questions : 5

- (a) What are the three different types of molecular velocities? Discuss the Maxwell speed distribution of molecular velocity. 3+2=5
- (b) Explain the cause of deviation of real gas from ideal behaviour. Discuss the three different types of critical constants. 2+3=5

24J/908

(Continued)

(5)

UNIT—IV

10. Answer any *three* of the following questions :
1×3=3

- (a) What is the effect of temperature on surface tension?
- (b) Explain why liquid drops are spherical.
- (c) Calculate the number of atoms per unit cell for f.c.c. crystal.
- (d) What is F -centre?

11. Answer any *one* of the following questions : 2

- (a) State and explain Bragg's law.
- (b) Write a brief note on liquid crystal.

12. Answer any *one* of the following questions : 5

- (a) Define surface tension. Discuss the experimental method of determination of surface tension using stalagmometer. 2+3=5
- (b) State the law of Miller indices. Discuss Schottky and Frenkel defects in crystal. 2+3=5

24J/908

(Turn Over)

