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CHE 526, CHE 527, CHE 528

M.Sc. (IVth SEMESTER) EXAMINATION, 2024-25

(CBCS MODE)

CHEMISTRY

Time : Three Hours] [Maximum Marks : 75

CHE 526

(Chemical Kinetics, Solid State and Reaction Dynamics)

Note: There are **three** sections, (**A, B** and **C**) and Candidate has to attempt questions from all sections. Marks are indicated against each section.

Section–A

1. Answer all questions : 5×3=15

   (a) What do you mean by molecular collision and collision diameter ?

   (b) What are the weakness of studying a fast reaction by flow method ?

   (c) What is Wagner reaction mechanism ?

   (d) Explain objection of Hinshelwood theory.

(e) What do you mean by Brusselator and Oregonator ?

Section–B

Note : Answer all questions of the following. 4×5=20

2. (a) Discuss different types of chemical chaos.

Or

(b) Explain elastic and inelastic collisions and highlight their differences.

3. (a) Discuss the intermolecular potential and Lennard jones 6-12 potential.

Or

(b) Explain top-down and bottom-up approach for the synthesis of nanomaterial.

4. (a) Discuss the term "Bistability" in the case of oscillatory reaction.

Or

(b) Explain limitation of Lindemann theory.

5. (a) Discuss the flash photolysis technique for the studies of fast reaction.

Or

(b) Write a short note on the application of nanomaterials.

Section-C

Note : Answer any <u>two</u> questions of the following. 2×20=40

6. What is autocatalysis ? Illustrate the B-Z reaction mechanism for oscillating reaction.

7. Explain thermodynamics of Schottky defects.

8. Discuss the collision cross-section. Derive the relationship between the mean free path and the collision cross-section and show that the mean free path is inversely proportional to the collision cross-section.

9. Explain the shock-tube and relaxation techniques for the study of fast reaction.

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CHE 527

(Bioinorganic Chemistry)

Note: There are **three** sections, (**A, B** and **C**) and Candidate has to attempt questions from all sections. Marks are indicated against each section.

Section–A

1. Answer all questions. 5×3=15

(a) What do you understand by coenzymes ? Explain with one example.

(b) Explain the term cooperativity in heme group.

(c) What do you understand by blue electron carrier and blue oxidase enzyme ?

(d) Give different modes of bonding shown by N_2 (dinitrogen) molecule with metals.

(e) Give the effects of mercury poisoning in brief.

Section–B

Note : Answer all questions of the following. 4×5=20

2. (a) Explain photophosphorylation in detail with the chemical reaction involved.

Or

(b) Show the effect of pH on oxygen binding curves of Haemoglobin and myoglobin molecules.

3. (a) Explain the catalytic cycle of cytochrome P_{480} enzyme.

Or

(b) Explain the biological nitrogen fixation with diagram of nitrogenase enzyme.

4. (a) What do you understand by Wilson's disease ? Draw the chelating agents used in its treatment.

Or

(b) Give the diagram of catalytic cycle for cleavage of water molecule in photosynthetic pathway.

5. (a) What is the role of Ferritin in iron storage ?

Or

(b) Give the structure of cyanocobalamin and its functions in biological systems.

Section-C

Note : Answer any <u>two</u> questions of the following. 2×20=40

6. What are metalloenzymes ? Explain the mechanism of action of a nonredox metalloenzymes taking the example of carbonic anhydrase.

7. Explain the structure and activity of cytochrome 'C' with suitable diagrams.

8. What is the role of photosystem I and II in green plants. Explain with suitable diagrams. Give an account of metal complexes in transmission of energy.

9. Discuss the role of gold and lithium involved in chemotherapy.

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