Total No. of printed pages = 9

63/2 (SEM-3) CHM (E1, E5)

2022

(Held in 2023)

CHEMISTRY

(Theory Paper)

Paper Code : CHM-306-E1

(Biochemistry)

Full Marks – 80

Pass Marks – 32

Time – Three hours

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

1. Answer any *three* of the following questions : 5×3=15

(a) What do you mean by Metabolism ? Write the differences between Catabolism and Anabolism. 2+3=5

(b) What are Energy-rich and Energy-poor phosphates ? Discuss briefly the functions of ATP. 2+3=5

[Turn over

(c) Where does Gluconeogenesis occur? Discuss the reactions involved in Gluconeogenesis. 1+4=5

(d) What are the precursors of Gluconeogenesis? Write about the Gluconeogenesis of glycerol. 1+4=5

(e) Discuss briefly about Cori cycle. 5

2. Answer any *four* of the following questions : 5×4=20

(a) Describe briefly the important features of a DNA double helix. 5

(b) Define nucleotide and nucleoside. What are the basic differences between the different of nucleic acids ? 2+3=5

(c) What is meant by complementary base pair ? What are the major forces that stabilizes the DNA double helix ? 1+4=5

(d) Name the different RNA molecules involved in protein synthesis. What is cloning ? Explain briefly. 3+2=5

(e) Write briefly the different steps involved in DNA replication. 5

(f) Explain the hydrolysis of nucleic acids. 5



3. Answer any *three* of the following questions : 5×3=15

(a) Describe the secondary structure of proteins. 5

(b) Write short note on biosynthesis of amino acids. 5

(c) What do you mean by transcription and translation ? 5

(d) Write are polypeptides ? What are the different bonds involved in proteins ? Draw a schematic diagram to show the structure of polypeptides. 1+2+2=5

(e) What is tRNA ? Discuss its role in protein synthesis. 1+4=5

4. Answer any *six* of the following questions : 5×6=30

(a) Discuss the binding of $O_2$ at the active site of hemocyanin. Why hemocyanin is called blue blood ? 3+2=5

(b) Discuss the mechanism of $Na^+ - K^+$ pump. Why it is electrogenic in nature ? 4+1=5

(c) Explain the binding of cis-platin with DNA of cancerous cell. Mention the toxic effects of cis-platin. 3+2=5

(d) What is siderosis. Mention the drug used for treatment of African siderosis. 1+4=5

(e) Discuss the functions of lactoferrin found in mother's milk. 5

(f) Draw and explain the $O_2$ binding curve for Hb and Mb with partical pressure of $O_2$. 5

(g) Draw the structure of $Fe_2S_2$ and $Fe_3S_4$ ferredoxin. Point out the number of labile inorganic sulphur. 2+2+1=5

(h) What is Chelate therapy ? How does it work ? Explain with suitable examples. 2+3=5



(Theory Paper)

Paper Code : CHM-306-E5

**(Supramolecular Chemistry)**

Full Marks – 80

Pass Marks – 32

Time – Three hours

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

1. Answer the following questions (*All* questions are compulsory) : 1×6=6

(a) Using the appropriate supramolecular host, it is possible to bind which of these guests ?

(i) Neutral species (ii) Anions

(iii) Cations (iv) All of these

(b) Who is the forefather of supramolecular chemistry ?

(i) George Witting

(ii) Charles Pedersen

(iii) Jean Marie Lehn

(iv) Donald Cram

(c) Which of the following is an example of supramolecule ?

(i) Glucose (ii) DNA

(iii) Thymine (iv) Caffeine

(d) What type of guest would a crown ether be able to bind ?

(i) Neutral species (ii) Anions

(iii) Cations (iv) Zwitterions

(e) As dendrimers have high surface functionality, so they tend to be ——— soluble than linear polymers.

(i) more (ii) less

(iii) equally (iv) very less

(f) Which of the following is not a component of dendrimer ?

(i) Central core

(ii) Stem

(iii) Interior dendritic structure

(iv) Exterior surface.



2. Answer the following questions : 2×5=10

(a) What is valinomycine ? How many peptide bonds are present in valinomycine ? 1+1=2

(b) Explain Lariat ethers with one example. 2

(c) Write the important properties of dendrimers. 2

(d) Write the application of dendrimers as nanoparticles. 2

(e) How can substitution reaction be completed in cyclodextrin complexes ? 2

3. Answer any *six* of the following questions : 5×6=30

(a) Explain the role of H-bonding in the formation of supramolecule. 5

(b) Explain the formation of Ionophores with example. 5

(c) Define spherands ? Write the three conditions of anion for the formation of spherands. 2+3=5

(d) How does crown ether form complexes with alkali metal ? 5

(e) Explain $^{13}C$ NMR spectra of $C_{60}$ and $C_{70}$. 5

(f) Explain one method to synthesise dendrimers. 5

(g) Explain the structure of fullerenes. 5

(h) Explain in details CD-mediated rearrangements reactions. 5

(i) Explain in details supramolecular electrochemistry. 5

4. Answer any *two* of the following questions : 10×2=20

(a) What are the different forms of cyclodextrins ? Explain the mechanisms how inclusion complexes are formed with cyclodextrins. 5+5=10

(b) Explain in details a method for the preparation of $C_{60}$ and $C_{70}$. 10

(c) Write short notes on any *two* of the following : 5×2=10

(i) Supramolecular photochemistry

(ii) Fullerides

(iii) Biomimetic hydrogen bonding.



5. Answer any *one* of the following questions : 14×1=14

(a) Explain the basic concepts of host guest complexation by lock and key model. Write the mathematical expression of strength and selectivity of host guest interaction. 10+4=14

(b) (i) Explain reduction reactions of fullerenes. 8

(ii) How can cycloaddition reaction be accomplished in CD cavities ? 6