Part-C: (1X15=15 marks), Answer in detail (< 5 pages) – you could use additional sheets for capturing your thoughts. Apply the learning from relevant courses.

1. Imagine you are asked to address a design challenge "To design a water filter to be used for filtering water having high salt content typically available in cities like Mumbai or Chennai" in a timeframe of 36 weeks. How would you approach this problem?
   a. Would you carry out an elaborate discovery or only diagnosis? If so, why? What would you expect to derive at the end of your diagnosis?
   b. How would you realize the physical solution after diagnosis? Define a sample functional hierarchy and trace the transformation to the physical solution.
   c. What are the two key steps in this transformation? What kind of creativity is possible in each step? Illustrate using the above requirement.

DS2000: Systems Thinking for Design

End-Semester Examination, Nov 2022 (40 Marks)

Note for students: Please return the question paper along with the answer sheet
Answer all questions

Part-A: Fill in the blanks (10 X 1 = 10 Marks)

1. In what year was the make in India initiative launched by the government of India?
2. Name one key expectation from industry from a fresher who is just starting their career.
3. A real-world problem has the following
   i. Unambiguity
   ii. Uncertainty
   iii. Inter-dependency
   iv. Multi-disciplinary

   Answer true or false with a brief justification.
4. In the suggested video lecture by Hans Rosling - "the best stats you've ever seen", he compares the knowledge of swedish students with ____
5. Simplification should eliminate _____ complexity, not _____ complexity
6. Transitive is a type of relation in which two parts are related through a _____ part
7. Complexity is the result of interactions among _____
8. _____ feedback is deviance amplifying
9. _____ Can be used as a measure of complexity
10. In the experiment conducted by Milagram in 1967, he found that that average number of links was ____

Part-B: Short Answers using Tables/Diagrams (3X5 = 15 marks) Answer in brief (one page for each question).

1. Consider any one product of your choice. Pick one that you think is good and one that you think is bad.
   a. Explain the difference in terms of the key elements of the product specification, i.e., what is its form, function, expected behaviour, structure, content, medium, process? Use a Tabular format and highlight the key differences
   b. Map the relationships among the key elements. Explain what difference do you see in the relationship among the elements in the two products?
2. How can the concept of 'requisite hierarchy' help in product design? Explain using the ISM of key objectives drawn from your assignment. Illustrate how you would derive a function from one objective derived by combining a stakeholder need with alterable and constraint.
3. How can the concept of 'cluster' (from complex networks) help in product design – functional and structural design? Explain with one example drawn from your assignment.