

316365

25226

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any FIVE of the following :** **10**
- a) List any four components of the cold chain management.
 - b) List any four insulating material used in the cold chain packaging.
 - c) Define :
 - i) Return on Investment (ROI)
 - ii) Life Cycle Cost Analysis (LCCA)
 - d) Name any four components of the chart recorder used in the cold chain monitoring.
 - e) State any four Indian authorities responsible for cold chain regulations.
 - f) Suggest two operational practices to minimize heat gain if door opening losses are high in a frozen food ware house.
 - g) State any four applications of the cold chain management.

P.T.O.

2. Attempt any THREE of the following : 12

- a) Explain the importance of Global cold chain management.
- b) Choose any four IoT-based monitoring and control systems in a refrigerated containers to enhance cold chain efficiency and reduce product spoilage.
- c) Explain the role of Indian Government in framing the policies and regulations for effective cold chain management.
- d) Explain the best practices of International Institute of Refrigeration (IIR) in the cold chain management.

3. Attempt any THREE of the following : 12

- a) Explain the construction and working of Multi-Temperature trailer with the help of a neat sketch.
- b) Suggest any four corrective actions if a cold storage reports high energy consumption per ton stored.
- c) Explain the role of Indian Railways in the cold chain system in India.
- d) Explain the four steps required to maintain quality in the cold chain with reference to the following parameters :
 - i) Temperature and Humidity monitoring
 - ii) Proper packaging
 - iii) Staff training
 - iv) Facility and equipment readiness.

4. Attempt any THREE of the following : 12

- a) Apply different strategies adopted for sustainable packaging for a vegetable distributor in cold chain.
- b) Explain the 4 “Rs” of cold chain management.
- c) Describe any four roles of Bureau of Indian Standards (BIS) in ensuring reliable cold chain equipment.

- d) Differentiate between fixed costs and variable costs in cold chain w.r.t. following parameters.
 - i) Dependency on activity level.
 - ii) Example in cold chain
 - iii) Time Horizon Impact
 - iv) Cost behaviour during seasonal demand.
- e) Apply the Food Safety and Standards Authority of India (FSSAI) licensing and compliance requirements to the operation of a small cold storage facility.

5. Attempt any TWO of the following :

12

- a) Explain any six Key Performance Indicators (KPI's) used in the cold chain management.
- b) Apply suitable emergency response and contingency planning steps to handle the situation and prevent product loss if, A refrigerated truck transporting vaccines reports a temperature excursion due to power failure.
- c) Describe the construction and working of a solar-powered temperature - controlled vehicle with a neat sketch.

6. Attempt any TWO of the following :

12

- a) Develop a vaccine cold chain strategy to ensure safe delivery, proper storage and effective immunization coverage in remote and urban areas.
 - b) Suggest any six suitable technologies briefly for cold chain compliance, if a vaccine logistics firm wants tamper - proof records, predictive maintenance and reduced carbon foot print.
 - c) Apply the challenges of retrofitting older cold chain infrastructure to the difficulties faced by small rural cold storage units in adopting sustainable technologies.
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