Q1. (A) a) Define biotic stress. Enlist different mechanisms of insect resistance in crop plant and explain in brief antixenosis. 5

b) Define molecular markers. Enlist different types of molecular markers and explain in brief advantages of marker assisted selection in crop improvement. 5

(B) a) Define photosynthesis. Explain in brief factors affecting photosynthesis. 5

b) Define plant growth regulator. Explain the application of plant growth regulators in crop improvement. 5

Q2. (A) What is scheduling of irrigation ? Give the different criteria adopted for irrigation scheduling and explain any one in detail. 10

(B) Define farming system. List out how will you evaluate cropping/farming system and explain any one criteria in detail. 10

Q3. (A) Define soil fertility and soil productivity. State different approaches adopted for the evaluation of soil fertility. 10

(B) State the objectives of soil testing and plant testing. 10

Q4. (A) Classify the feeding stuffs of livestock and describe in detail digestion and absorption of lipids in ruminants. 10

(B) Enlist and describe the factors affecting quality of milk in cow. 10

Q5. (A) Discuss the major causes of Inflation and suggest effective measures to control it. **10**

(B) Evaluate the startup India Scheme for entrepreneurship development in India. **10**

Q6. (A) Enlist the insect pests infesting mango and give the nature of damage and management practices for mango hoppers and stem borer. **10**

(B) Describe various enzymes involved in the process of pathogenesis by fungal plant pathogens. **10**

Q7. (A) State briefly the classification of emitters used in drip irrigation system according to any five of several characteristics; and classification of sprinkler irrigation system based on any five considerations of portability. **10**

(B) The drainage ditch or channel of the surface drainage system is to be designed to drain land area of 400 ha. The drainage coefficient of land is 20 mm. Calculate the discharge or water carrying capacity of the drainage ditch required at it's outlet end. Find the dimension of the most economical section of the drainage ditch to carry above discharge. Consider the rectangular section of the drainage ditch or channel. The longitudinal slope of the drainage ditch is 1 in 500. Consider the value of Chezy's roughness coefficient as 50 $m^{1/2}/s$. **10**

Q8. Define soil erosion. Give the forms of water erosion and factors affecting water erosion. **20**

Q9. (A) Define tillage and its objectives. Describe classification of tillage. 10

(B) What do you mean by Renewable Energy ? Explain Solar and Geothermal energy. 10

Q10. (A) Write the concept and process of paddy parboiling. Discuss advantages and disadvantages of paddy parboiling. 10

(B) What is silo ? Explain different types of fodder silos. Work out major dimensions of a pit silo for a herd of animals with details given in table. The silage is to be fed 160 days a year. Make rational assumptions. 10

Animal Breed	Body Wt. per animal (kg)	No. of animals	Rate of feeding per 100 kg body weight (kg)
Buffaloes	680	40	4.0
Cows	450	60	3.0
Bullocks	500	20	3.5
Heifers	180	20	3.0

Q11. Attempt any **TWO** out of following three subquestions.

(A) Explain commercial cultivation of banana on the following points. 10

a) Soil and climate

b) Varieties

c) Propagation and planting

d) Harvesting stage and yield

e) Problems in cultivation.

(B) Describe production technology of Tuberose on the following points under open field conditions. 10

a) Uses

b) Varieties and their types

c) Propagation and planting

d) Nutrition

e) Harvesting and yield.

(C) Write about the commercial cultivation of grapes in Maharashtra State for table purpose on the following points. 10

a) Propagation and root stocks

b) Training and pruning

c) Varieties

d) Harvesting and yield

e) Physiological disorders.

Q12. Attempt any **TWO** out of following three subquestions.

(A) Define genetic engineering. Enlist the various methods of genetic transformation. Explain in detail about most widely used method of gene transfer. 10

(B) Molecular markers are superior over morphological and biochemical markers. Justify it. 10

(C) Define biotechnology. Describe in brief scope and importance of biotechnology in various fields. 10

Q13. Attempt any **TWO** out of following three subquestions.

(A) What are psychrotrophic bacteria, and how do they affect milk quality ? How do probiotics in dairy products benefit human health ? **10**

(B) Compare and contrast single, double and multiple sampling plans in food quality assurance. Explain the steps involved in designing a food product sampling plan. Classify nutraceuticals with suitable examples. **10**

(C) Compare High-Pressure Processing with traditional thermal processing methods in terms of effectiveness and food quality retention. Explain the working principle of High Pressure Processing (HPP). Write advantages and limitations of High Pressure Processing. **10**

Q14. Attempt any **TWO** out of following three subquestions.

(A) Discuss the concept of Financial inclusion in the context of Indian agriculture. How do initiatives like Jan Dhan Yojana, Kisan Credit Card (KCC), and micro finance institutions contribute to improving rural credit accessibility ? Highlight the challenges and suggest measures for improvement. **10**

(B) Analyse the key challenges and opportunities in India's food business sector. How can innovation, policy reforms and sustainable practices contribute to its long-term growth and global competitiveness ? **10**

(C) What are the externalities in agribusiness projects ? Explain the differences between positive and negative externalities ? How can externalities be internalized to improve project sustainability ? **10**

Q15. (A) What shall be given greater consideration by fisheries resource managers in the context of Indian marine fisheries : Maximum Sustainable Yield (MSY) or Maximum Economic Yield (MEY) ? Justify your answer. **10**

(B) How does USA's recent tariff on fish and shrimp product exports from many countries affect India's seafood export competitiveness ? Can India still retain its comparative advantage over Vietnam and Equador in USA market ? Elaborate. **10**

Q16. (A) Write classification of protein and write their functions, sources deficiency and daily requirements. **10**

(B) Describe National Policy for the empowerment of women. Write goals and objectives of policy (any 3). **10**