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| **Course Code** | **18AG1001** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF AGRONOMY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Who is known as the father of “Green Revolution” of India? | | CO1 | R | | 1 |
| 2. | Expand ICRISAT. | | CO1 | R | | 1 |
| 3. | Law of heredity was given by \_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 4. | Define Agronomy. | | CO4 | R | | 1 |
| 5. | Write about Topping & De-trashing. | | CO6 | U | | 1 |
| 6. | What is tillage and tilth? | | CO3 | R | | 1 |
| 7. | Define biofertilizers. | | CO3 | U | | 1 |
| 8. | What are the noxious weeds? | | CO3 | R | | 1 |
| 9. | List out macro nutrients and micro nutrients. | | CO3 | U | | 1 |
| 10. | Define vermicompost. | | CO3 | U | | 1 |
| 11. | Write about Embryo & Seed coat. | | CO4 | U | | 1 |
| 12. | Whose period is called as ‘Golden period of agriculture’ in India? | | CO4 | R | | 1 |
| 13. | What is shifting cultivation? | | CO5 | R | | 1 |
| 14. | What is Subsistence farming? | | CO5 | R | | 1 |
| 15. | Explain trap crops. | | CO6 | U | | 1 |
| 16. | What % of Indian population depends on agriculture for their livelihood? | | CO6 | R | | 1 |
| 17. | Who developed mould board plough? | | CO3 | U | | 1 |
| 18. | What is law of minimum? | | CO1 | R | | 1 |
| 19. | In which year \_\_\_\_\_\_\_\_\_ Imperial Agricultural Research Institute was established at \_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 20. | In Tamil Nadu Sugarcane Breeding Institute was established in the year \_\_\_\_\_\_\_\_\_ a) 1930 b) 1915 c) 1910 d) 1912 | | CO3 | A | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Write the scope and importance of Agronomy. | | CO4 | | An | 5 |
| 22. | What are the modern concepts of tillage? | | CO2 | | An | 5 |
| 23. | Describe classification of nutrients and criteria of essentiality of nutrients. | | CO3 | | An | 5 |
| 24. | What is organic manures? Write about classification of organic manure with example. | | CO2 | | U | 5 |
| 25. | Explain classification of fertilizers. | | CO2 | | R | 5 |
| 26. | Write about seed treatment. Explain methods of seed treatment and its objectives. | | CO1 | | An | 5 |
| 27. | Elaborately discuss about factors affecting (intensity & depth) the tillage operation. | | CO1 | | U | 5 |
| 28. | Write down the harmful and beneficial effects of weeds. | | CO4 | | R | 5 |
| 29. | Explain crop rotation, with its advantages and principle. | | CO6 | | An | 5 |
| 30. | Explain about different methods of seed sowing. | | CO5 | | U | 5 |
| 31. | Explain the steps for establishing optimum plant density. | | CO6 | | An | 5 |
| 32. | Elaborately discuss about factors affecting seed germination. | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain the agronomic and seasonal classification of crops based on growth habits. | CO2 | | R | 8 |
|  | b. | Define weed control. Elaborate the different methods of weed control with its merits and demerits. | CO6 | | R | 7 |
| 34. | a. | Write in detail about special, primary and secondary tillage. | CO5 | | U | 8 |
|  | b. | Define seeds. What are the different types of seeds and their characteristics? | CO3 | | R | 7 |
| 35. | a. | Define weed. Write about classification of weeds. | CO4 | | R | 8 |
|  | b. | Define allelopathy. Explain its types and effects on weed and crop. | CO4 | | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand basics of crop characteristics and its classification. |
| CO2 | Outline the basics of crop characteristics and its classifications. |
| CO3 | Identify crops, seeds, fertilizers, pesticides, farm /tillage implements. |
| CO4 | Acquire scientific knowledge on weeds, its impacts on crop growth and integrated weed management. |
| CO5 | Apply fundamentals of growth concepts, factors influencing and its relationship to nutrients applied. |
| CO6 | Describe crop rotation, its principles and apply knowledge of crop management techniques in crop. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 5 |  | 5 |  |  | 13 |
| CO2 | 11 | 6 |  | 5 |  |  | 22 |
| CO3 | 9.5 | 4 | 1 | 5 |  |  | 19.5 |
| CO4 | 13.5 | 8.5 |  | 5 |  |  | 27 |
| CO5 | 2 | 16 |  |  |  |  | 18 |
| CO6 | 1 | 14.5 |  | 10 |  |  | 25.5 |
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| **Course Code** | **18AG1002** | **Duration** | **3hrs** |
| **Course Name** | **AGRICULTURAL HERITAGE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | What is urban agriculture? | | CO1 | | R | | 1 |
| 2. | Define Pesant Farming. | | CO1 | | R | | 1 |
| 3. | Expand NARS. | | CO2 | | U | | 1 |
| 4. | Define Heritage. | | CO2 | | R | | 1 |
| 5. | List out the two CGIAR centres. | | CO2 | | R | | 1 |
| 6. | Write four branches of Agriculture. | | CO1 | | A | | 1 |
| 7. | Define *Kharif* crops. | | CO2 | | R | | 1 |
| 8. | Define recessional farming. | | CO2 | | R | | 1 |
| 9. | What is lapse rate? | | CO2 | | R | | 1 |
| 10. | Define Agriculture. | | CO1 | | R | | 1 |
| 11. | Expand CIMMYT. | | CO2 | | U | | 1 |
| 12. | Write four agricultural season of India. | | CO4 | | A | | 1 |
| 13. | The Indus Valley is the home of \_\_\_\_\_\_\_\_\_\_ crop cultivation. | | CO1 | | U | | 1 |
| 14. | Define ITK. | | CO2 | | R | | 1 |
| 15. | Define Agricultural Heritage. | | CO1 | | R | | 1 |
| 16. | Expand IRRI and CAZRI. | | CO3 | | U | | 1 |
| 17. | Expand GDP and GNI. | | CO3 | | U | | 1 |
| 18. | Define Alfisols. | | CO5 | | U | | 1 |
| 19. | Write the future prospects of Indian Agriculture. | | CO2 | | A | | 1 |
| 20. | Write any two National Research Centres in India. | | CO3 | | A | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Discuss theoretical basis of weather forecasting from ancient literatures. | | CO3 | | A | | 5 |
| 22. | Write the importance of Agricultural Heritage. | | CO1 | | U | | 5 |
| 23. | List out the characters and problems in Indian Agriculture. | | CO5 | | R | | 5 |
| 24. | Draw the flow chart for organizational structure for Agricultural Universities. | | CO5 | | R | | 5 |
| 25. | Discuss the Agriculture from Sangam literature. | | CO1 | | U | | 5 |
| 26. | Discuss the roles and importance of ITK. | | CO4 | | A | | 5 |
| 27. | Write a short note on agricultural research activities in the British era for our country. | | CO1 | | R | | 5 |
| 28. | Discuss the history of irrigation development in India. | | CO1 | | R | | 5 |
| 29. | Write the major soils of Tamil Nadu. | | CO1 | | U | | 5 |
| 30. | Explain the strategies for rural women’s empowerment. | | CO4 | | A | | 5 |
| 31. | Write the importance of agriculture. | | CO1 | | U | | 5 |
| 32. | Mention the relationship between main branches of agriculture. | | CO1 | | R | | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | a. | Write in details the braches of agriculture. | CO5 | A | | 8 | |
|  | b. | Discuss the Green revolution and its impact in Indian Agriculture. | CO2 | A | | 7 | |
| 34. | a. | Explain the impacts of green revolution in India. | CO1 | A | | 8 | |
|  | b. | Elaborate the plant production and protection through ITK. | CO2 | E | | 7 | |
| 35. | a. | Write short notes on special category of crops | CO2 | A | | 8 | |
|  | b. | Explain farm mechanization. | CO6 | A | | 7 | |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand agricultural heritage of India, agricultural resources and development of Indian agriculture from ancient to modern era. |
| CO2 | Compare indigenous traditional knowledge in agriculture and crop voyage in India and the world. |
| CO3 | Describe gender perspective, tasks of farm women, women empowerment and self-help groups. |
| CO4 | Apply Indigenous Traditional Knowledge (ITK) in modern agricultural practices. |
| CO5 | Visualize transition of agriculture from past to present. |
| CO6 | Acquire knowledge on gender issues in agriculture for women empowerment and implement women-friendly agricultural technologies. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 19 | 21 | 15 | 1 |  |  | 56 |
| CO2 | 6 | 2 | 15 | 1 |  |  | 24 |
| CO3 |  | 2 |  | 6 |  |  | 8 |
| CO4 |  |  |  | 11 |  |  | 11 |
| CO5 | 10 | 1 |  |  |  |  | 11 |
| CO6 |  |  |  | 15 |  |  | 15 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG1012** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF AGRICULTURAL ECONOMICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Who proposed the economic definition of wealth? | | CO1 | U | | 1 |
| 2. | What is the other name for income theory? | | CO1 | R | | 1 |
| 3. | Define "Supply". | | CO1 | R | | 1 |
| 4. | Which word is closely related to economics? | | CO2 | R | | 1 |
| 5. | Expand GNP. | | CO2 | U | | 1 |
| 6. | Define Microeconomics. | | CO2 | R | | 1 |
| 7. | Which type of utility is created during the storage of a commodity? | | CO3 | U | | 1 |
| 8. | A monopoly is a market with \_\_\_\_\_\_\_\_\_\_ seller. | | CO3 | R | | 1 |
| 9. | Expand RRB. | | CO3 | U | | 1 |
| 10. | Give one example of non-institutional sources of credit. | | CO4 | U | | 1 |
| 11. | The demand curve slopes downward. True/False. | | CO4 | U | | 1 |
| 12. | Define Rent \_\_\_\_\_\_\_\_\_. | | CO4 | R | | 1 |
| 13. | Risk and uncertainty definition. | | CO5 | R | | 1 |
| 14. | What is deflation? | | CO5 | R | | 1 |
| 15. | Recall the expansion of LDMU. | | CO6 | U | | 1 |
| 16. | Define wage. | | CO6 | R | | 1 |
| 17. | The indifference curves do not intersect (True or False). | | CO6 | U | | 1 |
| 18. | What does "production function" mean? | | CO1 | R | | 1 |
| 19. | GDP plus net factor income from abroad is called \_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 20. | What is "Personal Income"? | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Explain the law of supply and the factors influencing supply. | | CO1 | | An | 5 |
| 22. | Write a short note on the price elasticity of demand and interpret it based on its degrees. | | CO2 | | U | 5 |
| 23. | Illustrate three factors of production function and their characteristics. | | CO3 | | An | 5 |
| 24. | Explain about 5C’s and 7P’s. | | CO4 | | U | 5 |
| 25. | Explain in detail the Malthusian theory of population. | | CO5 | | An | 5 |
| 26. | Elaborate Engels' law with suitable graph. | | CO1 | | U | 5 |
| 27. | Discuss in detail the Malthusian population Theory. | | CO6 | | An | 5 |
| 28. | Narrate the characteristics of capital. | | CO5 | | U | 5 |
| 29. | Give a detailed note on market structure. | | CO3 | | An | 5 |
| 30. | Explain about the capitalist economy. | | CO4 | | U | 5 |
| 31. | Explain the method of calculating national income. | | CO6 | | An | 5 |
| 32. | Discuss in depth the five-year plan. | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Briefly discuss about the theories of interest and profit | CO1 | | U | 7.5 |
|  | b. | Explain Barter system and functions of money. | CO1 | | R | 7.5 |
| 34. | a. | What is elasticity? Briefly narrate the importance and measurement of elasticity of Demand. | CO3 | | An | 7.5 |
|  | b. | Explain in detail about consumer surplus with diagram | CO2 | | U | 7.5 |
| 35. | a. | What are the theories of Wage? Explain any two theories in detail. | CO3 | | R | 7.5 |
|  | b. | List out different types of cost and write short notes on it. | CO3 | | U | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the principle and theories, and its role in planning for economic development of the country. |
| CO2 | Remember consumer behavior - utility maximization problem and demand theory. |
| CO3 | Explain fundamental concepts of agricultural economics, theory of production, theory of cost and output determination across market structures. |
| CO4 | Evaluate different agricultural finance systems and their role as credit agencies. |
| CO5 | Enumerate and discuss different taxes applicable to agriculture. |
| CO6 | Analise theory of general equilibrium and welfare economics. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 4 | 1 | - | 2 | - | - | 29.0 |
| CO2 | 2 | 5 | - | - | - | - | 21.5 |
| CO3 | 2 | 3 | - | 3 | - | - | 35.5 |
| CO4 | 1 | 5 |  | - | - | - | 13.0 |
| CO5 | 2 | - | - | 2 | - | - | 13.0 |
| CO6 | 1 | 4 | - | - | - | - | 13.0 |
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| **Course Code** | **18AG1014** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF AGRICULTURAL EXTENSION EDUCATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | What is the full-form of NGO? | | CO2 | C | 1 |
| 2. | Who is an opinion leader in a village? | | CO2 | E | 1 |
| 3. | What is E-extension, also known as cyber extension? | | CO1 | A | 1 |
| 4. | What is HYVP? | | CO1 | R | 1 |
| 5. | What is KVK? | | CO1 | R | 1 |
| 6. | What is T & V System? | | CO1 | R | 1 |
| 7. | If you become the PM of India for one day, what is the first action you would take? | | CO3 | An | 1 |
| 8. | What do you mean by a folder, used in extension literature? | | CO4 | A | 1 |
| 9. | The first KVK was established in 1974 at which place? | | CO5 | R | 1 |
| 10. | Which was the first Indian newspaper? | | CO4 | R | 1 |
| 11. | Define skill. | | CO4 | U | 1 |
| 12. | What do you mean by photojournalism? | | CO5 | An | 1 |
| 13. | What is the meaning of agricultural extension? | | CO5 | U | 1 |
| 14. | Define IAAP. | | CO1 | A | 1 |
| 15. | What is field tour? | | CO3 | U | 1 |
| 16. | What is the full-form of PRA? | | CO3 | U | 1 |
| 17. | Define leadership. | | CO3 | U | 1 |
| 18. | What is IRDP? | | CO1 | R | 1 |
| 19. | What is CDP? | | CO1 | R | 1 |
| 20. | What is NES? | | CO1 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Describe the Community Development Programme of 1952. | | CO4 | E | 5 |
| 22. | Draw the Leagans’ model of communication and explain. | | CO4 | R | 5 |
| 23. | Write about the important concepts you have learnt in the course ‘Fundamentals of Agricultural Extension Education’. | | CO6 | C | 5 |
| 24. | Write down 8 steps in Extension Programme Planning Process. | | CO2 | An | 5 |
| 25. | Explain elements of administration (POSDCORB) according to Luther Gullick. | | CO6 | U | 5 |
| 26. | List the five directions of communication in an organization. | | CO1 | R | 5 |
| 27. | Write any three principles of extension. | | CO1 | U | 5 |
| 28. | Explain ‘monitoring’ and ‘evaluation’. | | CO5 | R | 5 |
| 29. | Explain any three types of leadership. | | CO5 | An | 5 |
| 30. | What are the elements of Diffusion process? | | CO2 | R | 5 |
| 31. | What are the barriers in Communication? | | CO3 | R | 5 |
| 32. | What are the stages of adoption? | | CO2 | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. |  | Explain the Transfer of Technology system in Agricultural Extension (KGS-KDS-KCS-ISAS) with a diagram. | CO3 | U | 15 |
| 34. | a. | Write an essay on Cyber/e-extension. | CO2 | A | 8 |
|  | b. | Elaborate: Individual, Group and Mass contact methods. | CO2 | An | 7 |
| 35. | a. | Elaborate 5 step process of Extension Education process. | CO3 | An | 8 |
|  | b. | Write an essay on different communication models with illustrations. | CO2 | A | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand agricultural extension and rural development programs. |
| CO2 | Create employment opportunity based on the knowledge gained on different schemes operated by state and central governments. |
| CO3 | Remember the new innovations in the area of agricultural extension in India |
| CO4 | Apply the practical knowledge gained on technology transfer from lab to land. |
| CO5 | Create awareness among farmers on different communication technology and journals available for scientific farming. |
| CO6 | Apply the Knowledge for uplifting poor and marginal farmers. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 11 | 5 | 2 |  |  |  | 18 |
| CO2 | 10 |  | 15 | 5 | 1 | 1 | 32 |
| CO3 | 5 | 18 |  | 16 |  |  | 39 |
| CO4 | 6 | 1 | 1 |  | 5 |  | 13 |
| CO5 | 6 | 1 |  | 6 |  |  | 13 |
| CO6 |  | 5 |  |  |  | 5 | 10 |
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| **Course Code** | **18AG2002** | **Duration** | **3hrs** |
| **Course Name** | **CROP PRODUCTION TECHNOLOGY - I (KHARIF CROPS)** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | \_\_\_\_\_\_\_\_\_\_ is important species in cotton. | | CO1 | R | | 1 |
| 2. | The primary center of origin for sorghum crop is \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 3. | Give the seed rate for medium and long duration rice. | | CO5 | R | | 1 |
| 4. | List out the important rice research station in Tamil Nadu. | | CO1 | R | | 1 |
| 5. | IIPR located at \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 6. | Write the water requirement for black gram. | | CO5 | R | | 1 |
| 7. | Expand IIMR and IRRI. | | CO1 | R | | 1 |
| 8. | Give two important short and medium duration varieties in Tamil Nadu respectively. | | CO5 | R | | 1 |
| 9. | List out four important forage crops. | | CO5 | R | | 1 |
| 10. | How to calculate the harvest index? | | CO1 | U | | 1 |
| 11. | The \_\_\_\_\_\_\_\_\_\_ crop is called as king of oilseeds. | | CO1 | R | | 1 |
| 12. | Recommended herbicide for pearl millet is\_\_\_\_\_\_\_\_\_\_. | | CO 2 | E | | 1 |
| 13. | Recommended seed rate for fodder sorghum for one hectare is \_\_\_\_\_\_\_\_\_\_. | | CO 2 | R | | 1 |
| 14. | Critical stage of irrigation for pulse crop is \_\_\_\_\_\_\_\_\_\_. | | CO 3 | U | | 1 |
| 15. | Extra-long stable cotton fiber length is \_\_\_\_\_\_\_\_\_\_. | | CO 1 | A | | 1 |
| 16. | Expansion of IGFRI is \_\_\_\_\_\_\_\_\_\_. | | CO 1 | An | | 1 |
| 17. | Write about types of jute with botanical name. | | CO2 | R | | 1 |
| 18. | The spacing of hybrid cotton is about \_\_\_\_\_\_\_\_\_. | | CO5 | R | | 1 |
| 19. | The grain of finger millet is rich in \_\_\_\_\_\_\_\_\_ nutrient. | | CO1 | R | | 1 |
| 20. | Give the best time of sowing for groundnut crop in Tamil Nadu. | | CO5 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | What is legume effect? Give the advantages. | | CO1 | | U | 5 |
| 22. | Differentiate sorghum poisoning and sorghum effect. | | CO3 | | A | 5 |
| 23. | Explain nursery management in ragi crop. | | CO5 | | A | 5 |
| 24. | Define aerobic rice and its advantages. | | CO1 | | U | 5 |
| 25. | Write nutrient management in groundnut crop. | | CO5 | | A | 5 |
| 26. | Discuss soil requirement for pearl millet crop. | | CO4 | | U | 5 |
| 27. | What is striga and how to manage it? | | CO6 | | A | 5 |
| 28. | Write agronomic practices for cluster bean. | | CO5 | | A | 5 |
| 29. | Write IWM and INM practices for rice cultivation. | | CO 2 | | A | 5 |
| 30. | Write a note on cotton growing season in Tamil Nadu. | | CO1 | | An | 5 |
| 31. | Calculate the urea, DAP, MOP requirement for the following crop for one hectare maize or groundnut cultivation. | | CO 2 | | E | 5 |
| 32. | Write fertilizer management and weed management for black gram. | | CO 3 | | C | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Elaborate the agro-techniques for SRI and its advantages over other method of rice cultivation. | CO5 | | A | 8 |
|  | b. | Discuss packages of practices for rice fallow cotton. | CO6 | | U | 7 |
| 34. | a. | Write in detail the constraints in pulses production in India and how to overcome the constraints. | CO1 | | A | 8 |
|  | b. | Discuss agro-techniques for maize crop production. | CO5 | | U | 7 |
| 35. | a. | Discuss kharif season forage crop production. | CO5 | | U | 8 |
|  | b. | Write in detail the scope and importance of minor millets cultivation in India. | CO1 | | U | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the crop production technology for kharif crops. | | | | | | | |
| CO2 | Gain knowledge on geographical distribution of kharif crops. | | | | | | | |
| CO3 | Recall the morphological features and crop production requirements for kharif season crops. | | | | | | | |
| CO4 | Remember soil and climatic requirements of different kharif crop varieties. | | | | | | | |
| CO5 | Acquire the knowledge on crop management practices for kharif season. | | | | | | | |
| CO6 | Apply the acquired knowledge to guide the farmers for cultivating kharif crops. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 6 | 17 | 9 | 6 |  |  | 38 |
| CO2 | | 3 |  | 5 |  | 6 |  | 14 |
| CO3 | |  | 1 | 5 |  |  | 5 | 11 |
| CO4 | |  | 6 |  |  |  |  | 6 |
| CO5 | | 5 | 16 | 23 |  |  |  | 44 |
| CO6 | |  | 7 | 5 |  |  |  | 12 |
|  | | | | | | | | **125** |

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Description automatically generated with medium confidence**

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| **Course Code** | **18AG2003** | **Duration** | **3hrs** |
| **Course Name** | **AGRICULTURAL FINANCE AND COOPERATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Choose the correct answer  Crop loans are a) Self-liquidating loans b) Partially liquidating loans  c) Non-liquidating loans d) Both partially and self-liquidating loan. | | CO3 | A | | 1 |
| 2. | List out 3 R’s of credit. | | CO2 | R | | 1 |
| 3. | Choose true or false: Under Kisan Credit Card scheme, farmers should be the residents of the bank’s operational area. | | CO6 | A | | 1 |
| 4. | What is called as NPW? | | CO2 | R | | 1 |
| 5. | Which committee recommended the setting up of Farmers Service Cooperative society? | | CO3 | R | | 1 |
| 6. | What is called as Micro credit? | | CO3 | R | | 1 |
| 7. | Which is the central bank of our country? | | CO3 | R | | 1 |
| 8. | What is IMF? | | CO3 | R | | 1 |
| 9. | Expand NABARD. | | CO3 | U | | 1 |
| 10. | What is payback period? | | CO2 | R | | 1 |
| 11. | What is IRR? | | CO2 | R | | 1 |
| 12. | Choose true or false: Reserve Bank of India was established in 1935. | | CO1 | A | | 1 |
| 13. | Which conference resulted in the formation of world Bank? | | CO3 | R | | 1 |
| 14. | Who was the chairman of All India Rural Credit Survey Committee? | | CO3 | R | | 1 |
| 15. | Which is the hybrid type of credit agency that combine the goodness of commercial bank and cooperatives? | | CO3 | R | | 1 |
| 16. | What is called as consumer cooperatives? | | CO6 | R | | 1 |
| 17. | Which committee recommended the Lead bank scheme? | | CO3 | R | | 1 |
| 18. | Which type of credit is given when land is mortgaged as security? | | CO2 | R | | 1 |
| 19. | What are the 5 C’S of credit? | | CO2 | R | | 1 |
| 20. | What is Scale of Finance? | | CO3 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Explain the principles of Cooperatives. | | CO2 | | E | 5 |
| 22. | Distinguish institutional and non-institutional source of finance. | | CO1 | | An | 5 |
| 23. | Elaborate the functions of commercial banks in India. | | CO3 | | C | 5 |
| 24. | Compare the differences between financing of Agriculture and other Sectors. | | CO1 | | An | 5 |
| 25. | Distinguish development credit and production credit. | | CO1 | | An | 5 |
| 26. | Explain Balance sheet. | | CO4 | | U | 5 |
| 27. | Write in brief about the functions of RRB’s. | | CO1 | | R | 5 |
| 28. | Compare financing of agriculture and other sectors. | | CO1 | | An | 5 |
| 29. | Explain discounted measures of investment analysis. | | CO5 | | U | 5 |
| 30. | Explain the functions of Lead Bank. | | CO3 | | E | 5 |
| 31. | Explain the functions of NABARD. | | CO1 | | E | 5 |
| 32. | Explain income statement. | | CO4 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain the classification of Agricultural credit. | CO1 | | E | 7.5 |
|  | b. | Identify the reasons behind rural indebtedness in India. | CO1 | | A | 7.5 |
|  |  |  |  | |  |  |
| 34. | a. | Summarize the history of Cooperative movement in India. | CO3 | | U | 7.5 |
|  | b. | Elaborate the concept of micro finance. | CO3 | | C | 7.5 |
|  |  |  |  | |  |  |
| 35. | a. | Explain the functions of RBI. | CO3 | | E | 7.5 |
|  | b. | Organize and explain the 7 P’s of credit. | CO1 | | A | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand Financial system in India. |
| CO2 | Apply principles of banking and credit appraisal procedure. |
| CO3 | Analyze credit and deposit services of private, public and cooperative sector banks. |
| CO4 | Prepare and analyze Balance Sheet and Income and Expenditure Statements of a business unit. |
| CO5 | Develop skills in credit analysis, dealing with bankers, loan application procedures. |
| CO6 | Popularize farmer-friendly schemes of Crop insurance and Cooperative warehousing among farmers. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 |  | 16 | 20 | 12.5 |  | 53.5 |
| CO2 | 6 |  |  |  | 5 |  | 11 |
| CO3 | 9 | 8.5 | 1 |  | 12.5 | 12.5 | 43.5 |
| CO4 |  | 10 |  |  |  |  | 10 |
| CO5 |  | 5 |  |  |  |  | 5 |
| CO6 | 1 |  | 1 |  |  |  | 2 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2005** | **Duration** | **3hrs** |
| **Course Name** | **LIVESTOCK AND POULTRY MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Name any one method of identification in livestock. | | CO6 | U | | 1 |
| 2. | The gestation period of cow in daysis \_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 3. | Which breed of sheep produces pelt? | | CO2 | R | | 1 |
| 4. | The hormone responsible for the maintenance of pregnancy is \_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 5. | Peste des Petits Ruminants (PPR) is a viral disease affecting \_\_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 6. | Crop is an integral part of the digestive system of \_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 7. | Nili-Ravi is a breed of\_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 8. | The breed of goat that gives Pashmina, a high quality animal fibre is\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 9. | The act of parturition in pig is called\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 10. | The breed of buffalo with a tightly curved horn is \_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 11. | Incubation period of a duck egg is \_\_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 12. | An example of a monogastric or simple stomached animal is \_\_\_\_\_\_\_\_\_. | | CO4 | R | | 1 |
| 13. | Mastitis is the inflammation of \_\_\_\_\_\_\_\_\_. | | CO4 | R | | 1 |
| 14. | Disease caused by the bacteria *Brucellaabortus* in adult cattle is\_\_\_\_\_\_\_\_\_. | | CO6 | R | | 1 |
| 15. | Anthrax is a serious infectious disease caused by the bacteria \_\_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 16. | Immobility response is a method of estrus detection in \_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 17. | Give an example of a leguminous fodder crop. | | CO4 | U | | 1 |
| 18. | The first secretion from the mammary glands of cow after calving that is rich in antibodies is called \_\_\_\_\_\_\_\_\_. | | CO5 | R | | 1 |
| 19. | Foot and Mouth Disease (FMD) is a highly contagious disease of livestock caused by \_\_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 20. | Meat from goat is called \_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Describe the process of ruminant microbial digestion. | | CO6 | | An | 5 |
| 22. | Name and describe the characteristics of five indigenous breeds of poultry. | | CO2 | | U | 5 |
| 23. | State the importance and the functions of water in animal nutrition. | | CO3 | | An | 5 |
| 24. | Name any five indigenous sheep breeds of Tamil Nadu. | | CO4 | | U | 5 |
| 25. | What are the differences between hay and silage? | | CO5 | | An | 5 |
| 26. | What is disbudding in animal husbandry? | | CO6 | | U | 5 |
| 27. | What is biosecurity and what are the common biosecurity measures in livestock farm? | | CO1 | | An | 5 |
| 28. | Give a comparison of Indian and exotic breeds of cattle. | | CO2 | | U | 5 |
| 29. | What do you understand by the terms Isolation and Quarantine? | | CO3 | | An | 5 |
| 30. | Explain the care and management of pregnant and lactating animals. | | CO4 | | U | 5 |
| 31. | Explain the cause, types, symptoms, diagnosis and prevention of rabies in animals. | | CO5 | | An | 5 |
| 32. | What are the nutritional deficiency diseases of poultry? | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | What are the steps in clean milk production? | CO1 | | U | 7.5 |
|  | b. | Describe any 5 exotic breeds of pigs and their characteristics. | CO3 | | E | 7.5 |
| 34. | a. | Explain the structure of a chicken egg and draw and label the parts. | CO2 | | A | 7.5 |
|  | b. | Describe the different types of housing system in livestock. | CO5 | | U | 7.5 |
| 35. | a. | Describe the digestive system of chicken and draw a labelled diagram. | CO4 | | A | 7.5 |
|  | b. | Explain the estrus cycle and heat signs in cow. | CO6 | | R | 7.5 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Know the importance of farm animals and its influence in rural economy. | | | | | | | |
| CO2 | Distinguish the characteristics of indigenous and exotic breeds of cattle, goat, buffalo, swine and poultry. | | | | | | | |
| CO3 | Select quality breeds of livestock and poultry. | | | | | | | |
| CO4 | Choose nutritious feed rations and feeding of livestock and poultry. | | | | | | | |
| CO5 | Set up proper housing for farm animals and poultry. | | | | | | | |
| CO6 | Management of the common diseases of farm animals and birds. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | |  | 7.5 |  | 5 |  |  | 12.5 |
| CO2 | | 3 | 10 | 7.5 |  |  | 3 | 23.5 |
| CO3 | | 3 | 1 |  | 10 | 7.5 |  | 21.5 |
| CO4 | | 2 | 10 | 7.5 |  |  | 1 | 20.5 |
| CO5 | | 1 | 7.5 |  | 10 |  |  | 18.5 |
| CO6 | | 8.5 | 15 |  | 5 |  |  | 28.5 |
|  | | | | | | | | **125** |

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| **Course Code** | **18AG2006** | **Duration** | **3hrs** |
| **Course Name** | **AGRI INFORMATICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | GPS stands for \_\_\_\_\_\_\_\_\_. | | | CO2 | R | | 1 |
| 2. | Name the AI-based mobile app developed for plant disease diagnostics, pest damages, and nutrient deficiencies affecting crops. | | | CO3 | R | | 1 |
| 3. | IVRS stands for \_\_\_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 4. | Which is the independent NGO that focuses on training farmers to make and show short videos on agricultural technologies? | | | CO1 | R | | 1 |
| 5. | When was the Kisan Call Centres (KCC) scheme launched by the Ministry of Agriculture? | | | CO1 | R | | 1 |
| 6. | Define Agricultural Information System. | | | CO3 | R | | 1 |
| 7. | URL stands for \_\_\_\_\_\_\_\_\_. | | | CO4 | R | | 1 |
| 8. | AGRISNET\_\_\_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 9. | SMS Portal was inaugurated by the Hon’ble President of India on \_\_\_\_\_\_\_\_\_. | | | CO3 | R | | 1 |
| 10. | Name the ICT initiative of ITC Limited in India with rural [farmers](https://en.wikipedia.org/wiki/Farmers) *via* internet for procurement of [agricultural](https://en.wikipedia.org/wiki/Agriculture) products. | | | CO1 | R | | 1 |
| 11. | What is the Toll-free number of Kisan Call Centre? | | | CO1 | R | | 1 |
| 12. | The first expert system ever developed is \_\_\_\_\_\_\_\_\_. | | | CO6 | R | | 1 |
| 13. | What is a AQUA? | | | CO1 | U | | 1 |
| 14. | The water requirement for banana is \_\_\_\_\_\_\_\_\_ mm. | | | CO3 | R | | 1 |
| 15. | What is a Green SIM? | | | CO4 | U | | 1 |
| 16. | UPI stand for \_\_\_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 17. | Who is the scientist behind the experimental project “Hole in the Wall”? | | | CO3 | R | | 1 |
| 18. | Most of the Agri-Expert system are based on Rules and Knowledge representation in any expert system is in the form of \_\_\_\_\_\_\_\_\_. | | | CO6 | R | | 1 |
| 19. | Information Village Project was an ICT initiative of which non-profit organization \_\_\_\_\_\_\_\_\_. | | | CO1 | U | | 1 |
| 20. | The water requirement for maize is \_\_\_\_\_\_\_\_\_ mm. | | | CO3 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | What is Agriculture Expert System? Give three examples. | | | CO6 | | U | 5 |
| 22. | What is Evapo transpiration? Mention different methods of its estimation. | | | CO3 | | U | 5 |
| 23. | What is Contingency Crop Plan? List out the weather-related contingency plan. | | | CO5 | | U | 5 |
| 24. | What are computer models? Mention different types of models with examples. | | | CO3 | | U | 5 |
| 25. | What is the Fisher Friend Mobile Advisory app? | | | CO4 | | U | 5 |
| 26. | Write a short note on Digital green. | | | CO4 | | U | 5 |
| 27. | What is ITC e-Choupal? | | | CO4 | | U | 5 |
| 28. | Write a short note on e-Sagu project. | | | CO1 | | U | 5 |
| 29. | Write a note on function of Kisan Call Centers (KCCs). | | | CO1 | | U | 5 |
| 30. | Describe Geographic Information System (GIS). List out the various technologies that comes under GIS. | | | CO2 | | U | 5 |
| 31. | What is Minimum Data Set? Describe various parameters of Minimum Data Sets. | | | CO3 | | U | 5 |
| 32. | Write a brief note on Rice Crop Manager (RCM). | | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | What is a decision support system? | CO6 | | U | 5 |
|  | | b. | Give the classification of DSS according to Relationship and write the Taxonomies according to Daniel Power. | CO6 | | U | 10 |
| 34. | | a. | Explain Contingency Crop Plan. | CO5 | | U | 3 |
|  | | b. | Give a detailed explanation of different types of Contingency Crop Planning. | CO5 | | A | 12 |
| 35. | | a. | What is Geospatial Technology? Explain the role in Agriculture. | CO2 | | U | 5 |
|  | | b. | Explain different tools of Geospatial Technology. | CO2 | | U | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand use of information, communication and technology (ICT) in agriculture. |
| CO2 | Demonstrate use of GIS and GPS systems in precision agriculture. |
| CO3 | Develop computerized models to understand plant growth process. |
| CO4 | Use smartphone for farm advice, farm prices and post-harvest management. |
| CO5 | Manage input requirements for crops and animals. |
| CO6 | Use Agriculture Expert system and Soil Information Systems for farm decisions. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 7 | 12 | 0 | 0 | 0 | 0 | 19 |
| CO2 | 1 | 20 | 0 | 0 | 0 | 0 | 21 |
| CO3 | 6 | 20 | 0 | 0 | 0 | 0 | 26 |
| CO4 | 1 | 16 | 0 | 0 | 0 | 0 | 17 |
| CO5 | 0 | 8 | 12 | 0 | 0 | 0 | 20 |
| CO6 | 2 | 20 | 0 | 0 | 0 | 0 | 22 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2008** | **Duration** | **3hrs** |
| **Course Name** | **CROP PRODUCTION TECHNOLOGY II (RABI CROPS)** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Centre of origin of Barley is \_\_\_\_\_\_\_\_\_. | | CO 2 | R | | 1 |
| 2. | Scientific name of white oats is \_\_\_\_\_\_. | | CO 2 | R | | 1 |
| 3. | Name the state that produces maximum wheat in India. | | CO 1 | R | | 1 |
| 4. | Recommended seed rate of peas is \_\_\_\_\_\_\_ kg/ha | | CO 4 | R | | 1 |
| 5. | Leading producer of chickpea in the world is \_\_\_\_\_\_\_\_\_. | | CO 3 | R | | 1 |
| 6. | Write the species of wheat cultivated in maximum area in India. | | CO 2 | U | | 1 |
| 7. | Expand SSI \_\_\_\_\_\_\_\_\_. | | CO 6 | R | | 1 |
| 8. | Optimum temperature for juice making in gur is \_\_\_\_\_\_\_. | | CO 5 | A | | 1 |
| 9. | Name the gene responsible for dwarfness in wheat. | | CO 1 | A | | 1 |
| 10. | Bagasse can be used in the preparation of \_\_\_\_\_\_\_\_\_\_. | | CO 5 | R | | 1 |
| 11. | King of cereals \_\_\_\_\_\_\_\_\_\_ . | | CO 1 | R | | 1 |
| 12. | Write the botanical name of Chickpea. | | CO 2 | R | | 1 |
| 13. | Fruit of mustard is called as \_\_\_\_\_\_\_\_\_\_. | | CO 4 | R | | 1 |
| 14. | The CRI stage of wheat is \_\_\_\_\_\_\_\_\_. | | CO 3 | R | | 1 |
| 15. | Higher yield of pea could be achieved by using higher dose of \_\_\_\_\_\_ nutrient. | | CO 4 | R | | 1 |
| 16. | Scientific name of sunflower is \_\_\_\_\_\_\_\_. | | CO 4 | R | | 1 |
| 17. | Method of citronella propagation is \_\_\_\_\_\_\_\_. | | CO 5 | A | | 1 |
| 18. | Soil suitable for Lucerne cultivation is \_\_\_\_\_\_\_\_. | | CO 5 | U | | 1 |
| 19. | An ideal intercrop for fodder maize is \_\_\_\_\_\_\_\_. | | CO 5 | U | | 1 |
| 20. | Colour of desi Bengal gram is \_\_\_\_\_\_\_\_\_\_. | | CO 3 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Difference SSI and Conventional Sugarcane planting method. | | CO 5 | | R | 5 |
| 22. | Write in detail the special practices followed in Sugarcane. | | CO 5 | | R | 5 |
| 23. | Write in detail the major barley products. | | CO 2 | | U | 5 |
| 24. | Define (i) Nipping (ii) Detrashing (iii) Propping (iv) Thinning (v) Ratooning | | CO 1 | | An | 5 |
| 25. | Explain the economic importance of different mint varieties. | | CO 5 | | A | 5 |
| 26. | Differentiate desi and kabuli type of chickpea. | | CO 4 | | R | 5 |
| 27. | Write the important features of fodder legumes. | | CO 6 | | A | 5 |
| 28. | Write about the oil extraction process in lemon grass. | | CO 5 | | A | 5 |
| 29. | Elaborate Nutrient and Weed Management in fodder maize. | | CO 2 | | E | 5 |
| 30. | Explain management practices for improving seed setting in Sun flower. | | CO 4 | | U | 5 |
| 31. | Write a short note on artificial ripening of sugarcanes. | | CO 6 | | U | 5 |
| 32. | Crop logging techniques in sugarcane. | | CO 6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain the importance of pulses in India and suggest suitable measures for increasing its productivity. | CO 4 | | An | 7.5 |
|  | b. | Write the package practices for Chickpea. | CO 1 | | A | 7.5 |
| 34. | a. | Name the three wheat species grown in India and write their important features. | CO 2 | | An | 7.5 |
|  | b. | Write about the Agro-techniques of irrigated wheat in India. | CO 3 | | A | 7.5 |
| 35. | a. | Write about different methods of planting in sugarcane. | CO 5 | | A | 7.5 |
|  | b. | Write in detail the SSI. | CO 5 | | A | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the economic importance of Rabi crops. |
| CO2 | Know the agro-ecological requirements for Rabi crop production. |
| CO3 | Apply cultural practices for Wheat and Barley. |
| CO4 | Apply cultural practices for oilseeds and pulses. |
| CO5 | Apply cultural practices of sugarcane and medicinal crops. |
| CO6 | Be aware of the innovations and research advancements in Rabi crop production. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 1 | 8.5 | 5 |  |  | 16.5 |
| CO2 | 3 | 6 |  | 7.5 | 5 |  | 21.5 |
| CO3 | 3 |  | 7.5 |  |  |  | 10.5 |
| CO4 | 9 | 5 |  | 7.5 |  |  | 21.5 |
| CO5 | 11 | 1 | 12 | 15 |  |  | 39 |
| CO6 | 1 | 10 | 5 |  |  |  | 16 |
|  | | | | | | | 125 |

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| **Course Code** | **18AG2010** | **Duration** | **3hrs** |
| **Course Name** | **PRODUCTION TECHNOLOGY FOR FRUITS AND PLANTATION CROPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Mention any two TNAU varieties of mango crop. | | | CO2 | R | | 1 |
| 2. | Differentiate water sucker and sword sucker. | | | CO2 | R | | 1 |
| 3. | Which mutant variety is suitable for HDP in papaya crop? | | | CO3 | R | | 1 |
| 4. | Mention the scientific name of Guava \_\_\_\_\_\_\_\_\_\_\_. | | | CO3 | R | | 1 |
| 5. | Define stamen carpelody. | | | CO3 | U | | 1 |
| 6. | Disease of Papaya Ring Spot isdue to \_\_\_\_\_\_\_\_\_\_\_. | | | CO5 | A | | 1 |
| 7. | Sex reversal is the major physiological disorder in \_\_\_\_\_\_\_\_\_\_ crop. | | | CO5 | A | | 1 |
| 8. | Mention the two salt resistant rootstocks in grapes. | | | CO2 | R | | 1 |
| 9. | Define the ideal trellis method in grape cultivation. | | | CO3 | R | | 1 |
| 10. | Mention the two polyembryony varieties in Mango. | | | CO4 | An | | 1 |
| 11. | Mention the scientific name of sapota\_\_\_\_\_\_\_\_\_\_\_. | | | CO2 | R | | 1 |
| 12. | Define pairing and pralinage. | | | CO5 | R | | 1 |
| 13. | Study of tea is known as \_\_\_\_\_\_\_\_\_\_\_. | | | CO3 | R | | 1 |
| 14. | Define pruning and training. | | | CO3 | R | | 1 |
| 15. | Mention any two varieties of coffee \_\_\_\_\_\_\_\_\_\_. | | | CO2 | U | | 1 |
| 16. | Define tipping in tea crop. | | | CO4 | A | | 1 |
| 17. | Expand the given abbreviated words- IIHR,CTC and PKM. | | | CO1 | An | | 1 |
| 18. | Differentiate withering and rolling. | | | CO3 | An | | 1 |
| 19. | Explain the whip and tongue grafting. | | | CO3 | An | | 1 |
| 20. | Differentiate T- Budding and thinning in fruit crops. | | | CO3 | An | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |  |
| 21. | Explain the classification of citrus species, propagation methods and physiological disorder. | | | CO6 | | U | 5 |
| 22. | Write in detail the physiological disorder of banana and mango. | | | CO3 | | U | 5 |
| 23. | Describe the production technology of strawberry crop. | | | CO2 | | U | 5 |
| 24. | Write in detail the trellis types horticultural practices in grape crop. | | | CO2 | | U | 5 |
| 25. | Comment briefly on roots stock classification based on the abiotic and biotic stress tolerance and varietal specification in grapes crop. | | | CO3 | | U | 5 |
| 26. | Explain the propagation method of apple and litchi. | | | CO3 | | U | 5 |
| 27. | Write short notes on tea varieties. | | | CO3 | | U | 5 |
| 28. | Enumerate the pest and diseases of arecanut crop. | | | CO3 | | U | 5 |
| 29. | Discuss the importance and scope of fruit and plantation crop industry in India. | | | CO3 | | An | 5 |
| 30. | Explain the physiological disorder and post-harvest method of strawberry. | | | CO1 | | U | 5 |
| 31. | Describe the tapping method in rubber crop. | | | CO6 | | U | 5 |
| 32. | Explain the propagation method in Cashew. | | | CO3 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Explain the propagation method of mango crop. | CO3 | | U | 8 |
|  | | b. | Discuss the production technology of sapota crop. | CO3 | | U | 6 |
| 34. | | a. | Write in detail the production technology of arecanut crop. | CO3 | | U | 8 |
|  | | b. | Enumerate the production technology of mango crop. | CO2 | | U | 7 |
| 35. | | a. | Elaborate the physiological disorders of mango and papaya crop. | CO3 | | U | 8 |
|  | | b. | Describe the pest and diseases of apple, pineapple and papaya. | CO5 | | U | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the scope and importance of fruit and plantation crop production. | | | | | | | |
| CO2 | Apply propagation methods in fruit and plantation crops. | | | | | | | |
| CO3 | Apply production technologies in fruit and plantation crops. | | | | | | | |
| CO4 | Manage pests of fruit and plantation crops. | | | | | | | |
| CO5 | Control diseases of fruits and plantation crops. | | | | | | | |
| CO6 | Handle physiological disorders of fruit and plantation crops. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | - | 5 | - | 1 | - | - | 6 |
| CO2 | | 4 | 18.5 | - | - | - | - | 22.5 |
| CO3 | | 5 | 61 | - | 8 | - | - | 74 |
| CO4 | | - | - | 1 | 1 | - | - | 2 |
| CO5 | | 1 | 7.5 | 2 | - | - | - | 10.5 |
| CO6 | | - | 10 | - | - | - | - | 10 |
|  | | | | | | | | **125** |

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| **Course Code** | **18AG2012** | **Duration** | **3hrs** |
| **Course Name** | **PROBLEMATIC SOILS AND THEIR MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome / Bloom’s Level** | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | |
| 1. | During the ploughing or walk the farm animals get inundated into the soil due to \_\_\_\_\_\_. | CO3/U | 1 |
| 2. | Define soil health. | CO1/R | 1 |
| 3. | Mention few applications of remote sensing and GIS in agriculture. | CO5/A | 1 |
| 4. | Clay soils having the clay content \_\_\_\_\_\_\_. | CO1/R | 1 |
| 5. | Expands USLE. | CO3/R | 1 |
| 6. | What is Browning of rice? | CO3/U | 1 |
| 7. | Define LCC. | CO6/R | 1 |
| 8. | Who is the father of soil science? | CO5/R | 1 |
| 9. | Define any two water quality parameters. | CO2/U | 1 |
| 10. | What is the reclamation measure for acid soil? | CO4/An | 1 |
| 11. | Mention the management practices for soil crusting. | CO4/An | 1 |
| 12. | What is the reclamation measure for saline soil? | CO4/An | 1 |
| 13. | What is ‘R’horizon? | CO1/R | 1 |
| 14. | What is polluted water? | CO2/U | 1 |
| 15. | The infiltration rate for slowly permeable soil is \_\_\_\_\_\_\_. | CO3/U | 1 |
| 16. | Define quick lime. | CO4/U | 1 |
| 17. | Mention the reclamation practice for sub surface hard pan. | CO4/A | 1 |
| 18. | What is a soil health score card? | CO1/U | 1 |
| 19. | What is bioremediation? | CO4/U | 1 |
| 20. | What are the problems encountered with high permeable soil? | CO3/A | 1 |

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| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Mention the physical constraints in soil and explain them in detail. | CO3/R | 5 |
| 22. | How will you improve the soil health? | CO1/An | 5 |
| 23. | What are the effects of soil compaction on crops | CO3/U | 5 |
| 24. | Discuss about the Bio remediation of polluted soils through Multi-Purpose Trees. | CO4/A | 5 |
| 25. | Explain in detail the characteristics of a cultivable waste land. | CO1/U | 5 |
| 26. | Categorize the wastelands based on causative agents and give its distribution in India. | CO1/A | 5 |
| 27. | List of the waste land development board activities and mandatory | CO3/An | 5 |
| 28. | Explain about the different types of soil erosion. | CO3/U | 5 |
| 29. | How can saline water be utilized for crop cultivation? | CO4/C | 5 |
| 30. | Explain the formation of acid soils and describe its characters and reclamation measures. | CO4/A | 5 |
| 31. | Discuss in detail on land capability classification. | CO6/U | 5 |
| 32. | Write short notes on brackish water. | CO2/U | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | List out irrigation water quality parameters and explain its suitability using the standards. | CO2/E | 8 |
| b. | Describe the formation of sodic soils, its characteristics and reclamation measures. | CO4/A | 7 |
|  |  |  |  |  |
| 34. | a. | Describe the nutrient transformations in puddled soils. | CO3/An | 8 |
| b. | Write about the inputs which enhances the soil health. | CO1/U | 7 |
|  |  |  |  |  |
| 35. | a. | Discuss the applications of Remote sensing and GIS techniques in the diagnosis and management of problem soils. | CO5/A | 8 |
| b. | List out the various chemical constraints in soil and explain its characters and reclamation measures. | CO3/U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Interpret the soil quality based on their properties and characters. |
| CO2 | Interpret the quality of irrigation water. |
| CO3 | Categorise and characterize the problematic soils. |
| CO4 | Plan appropriate reclamation and management practices for problematic soils. |
| CO5 | Demonstrate the application of Remote sensing, GIS and bioremediation techniques in management of problematic soils. |
| CO6 | Explain the Land use pattern. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 1 ,5,7 | 5 | 5 |  |  | 26 |
| CO2 |  | 2,5 |  |  | 8 |  | 15 |
| CO3 | 1, 5 | 3,10,7 | 1 | 5,8 |  |  | 40 |
| CO4 |  | 2 | 1,5,7 | 3, 5, |  | 5 | 28 |
| CO5 | 1 |  | 1,8 |  |  |  | 10 |
| CO6 | 1 | 5 |  |  |  |  | 6 |
|  | 11 | 47 | 28 | 26 | 8 | 5 | **125** |
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**END SEMESTER EXAMINATION – NOV/DEC – 2022**

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| **Course Code** | **18AG2013** | **Duration** | **3hrs** |
| **Course Name** | **AGRICULTURAL MARKETING, TRADE AND PRICES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Choose True/ False, “India is not a founding member of WTO”. | | | CO6 | A | | 1 |
| 2. | Find the crop for which the Fair and Remunerative Price (FRP) is announced by Government. | | | CO1 | R | | 1 |
| 3. | Which marketing function creates place utility? | | | CO1 | R | | 1 |
| 4. | Choose the word for the act of covering up the item or product, to protect it from any damage  a. Packing b. Packaging c. Grading d. Labelling. | | | CO1 | A | | 1 |
| 5. | What is a Secular Market? | | | CO1 | R | | 1 |
| 6. | Choose True/False. GI stands for Geographical Indication. | | | CO6 | A | | 1 |
| 7. | What is Capital Market? | | | CO1 | R | | 1 |
| 8. | Name the utility created in converting groundnut into oil. | | | CO1 | R | | 1 |
| 9. | How many sellers are in a Duopoly market? | | | CO1 | R | | 1 |
| 10. | What is white revolution? | | | CO1 | R | | 1 |
| 11. | When the price of a commodity increases, its demand is likely to decrease. Say true or false | | | CO2 | R | | 1 |
| 12. | What is marketing efficiency? | | | CO2 | R | | 1 |
| 13. | When was Food Corporation of India established? | | | CO5 | R | | 1 |
| 14. | Choose True/ False, “The word “Market’ always refers to a place” | | | CO1 | A | | 1 |
| 15. | Find the year in which WTO was established. | | | CO5 | R | | 1 |
| 16. | Find the risk caused in marketing due to fire, flood, rodents, insects, pests, fungus, unscientific storage, improper package. | | | CO1 | R | | 1 |
| 17. | Name the Govt. agency responsible for procuring food grains for Public Distribution system in India. | | | CO5 | R | | 1 |
| 18. | Choose True/False. Retail market price will always be higher than that of the wholesale market price. | | | CO4 | A | | 1 |
| 19. | What is NCDC? | | | CO5 | R | | 1 |
| 20. | Name the segmentation of customers based on a geographic border. | | | CO1 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Explain in detail the cost-based and competition-based pricing strategies. | | | CO3 | | U | 5 |
| 22. | Define IPR and explain the various types of IPR with example. | | | CO6 | | R | 5 |
| 23. | Elaborate the activities of any two market functionaries in India. | | | CO4 | | C | 5 |
| 24. | Explain marketing efficiency and price spread. | | | CO2 | | U | 5 |
| 25. | What is risk in agricultural marketing and explain the ways to overcome the risks. | | | CO1 | | R | 5 |
| 26. | Discuss the types of Market Integration. | | | CO1 | | C | 5 |
| 27. | Choose any one crop insurance scheme in India and write in brief about its important features. | | | CO1 | | U | 5 |
| 28. | What is market segmentation? Explain the types of market segmentation. | | | CO1 | | R | 5 |
| 29. | List out the major benefits/importance of Agricultural marketing. | | | CO1 | | An | 5 |
| 30. | Explain Marketable and marketed surplus. | | | CO1 | | U | 5 |
| 31. | Discuss speculation, hedging and futures trading. | | | CO1 | | C | 5 |
| 32. | Explain in detail the warehouses in India. | | | CO5 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Explain in detail with examples about direct marketing channels in India. | CO4 | | E | 7.5 |
|  | | b. | Evaluate the functions of different marketing agents or functionaries. | CO4 | | E | 7.5 |
| 34. | | a. | Elaborate the meaning, role and types of Warehousing in India. | CO5 | | C | 7.5 |
|  | | b. | Discuss administered price. | CO4 | | C | 7.5 |
| 35. | | a. | Explain the classification of Markets. | CO1 | | E | 7.5 |
|  | | b. | Explain the role of Government in supporting Agricultural marketing in India. | CO5 | | U | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Know the contours of agricultural market ecosystem, different market structures and their functions. |
| CO2 | Analyze the demand and supply problems in agricultural marketing systems, marketing efficiency and policies. |
| CO3 | Demonstrate the methods of valuation of farm assets. |
| CO4 | Understand the food supply chain and its actors and activities. |
| CO5 | Gain practical skills on dealing with marketing institutions and warehouses. |
| CO6 | Understand international trade arrangements under WTO, Agreement on Agriculture (AOA) and EXIM policies. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 19 | 10 | 2 | 5 | 7.5 | 10 | 53.5 |
| CO2 | 2 | 5 |  |  |  |  | 7 |
| CO3 |  | 5 |  |  |  |  | 5 |
| CO4 |  |  | 1 |  | 15 | 12.5 | 28.5 |
| CO5 | 9 | 7.5 |  |  |  | 7.5 | 24 |
| CO6 | 5 |  | 2 |  |  |  | 7 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2019** | **Duration** | **3hrs** |
| **Course Name** | **CROP IMPROVEMENT-1(*KHARIF* CROPS)** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | What is XENIA effect? | | CO1 | U | | 1 |
| 2. | What is gynophore? | | CO4 | R | | 1 |
| 3. | What is protogyny? Give example. | | CO2 | R | | 1 |
| 4. | Give two examples for pest avoidance | | CO3 | U | | 1 |
| 5. | What is meant by pseudostyly? | | CO2 | U | | 1 |
| 6. | State the ‘center of origin’ for Cauliflower. | | CO1 | R | | 1 |
| 7. | Expand DIMBOA. | | CO3 | U | | 1 |
| 8. | Give the formula for calculating genetic advance. | | CO3 | R | | 1 |
| 9. | Redgram is \_\_\_\_\_\_\_\_\_\_\_\_\_ pollinated crop. | | CO2 | U | | 1 |
| 10. | What is bud pollination? | | CO4 | U | | 1 |
| 11. | State the name of wild progenitor of sorghum. | | CO2 | U | | 1 |
| 12. | State the botanical varieties of species *Solanum melongena.* | | CO3 | R | | 1 |
| 13. | State the diploid chromosome number of brinjal. | | CO1 | R | | 1 |
| 14. | What is Secondary Introduction? | | CO1 | R | | 1 |
| 15. | Give an example for male sterility which is governed by single recessive gene? | | CO4 | U | | 1 |
| 16. | *Abelmoschus manihot* spp *manihot* introduced into India from \_\_\_\_\_\_ as a source of resistance to YVMV. | | CO1 | R | | 1 |
| 17. | Name the bacterial genes involved in Bt crops? | | CO2 | U | | 1 |
| 18. | Name the wild progenitor of black gram. | | CO1 | R | | 1 |
| 19. | What is an isolation distance? Give an example for maize. | | CO4 | U | | 1 |
| 20. | What is an Ideotype? | | CO1 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Explain the different types of heterosis. | | CO1 | | An | 5 |
| 22. | Briefly describe about the types of plant genetic resources. | | CO2 | | U | 5 |
| 23. | Describe the emasculation and hybridization techniques in cotton. | | CO3 | | An | 5 |
| 24. | Write about the yield contributing traits for rice and cotton. | | CO4 | | U | 5 |
| 25. | Explain about the breeding objectives of rice. | | CO5 | | An | 5 |
| 26. | Describe the evolution of rice with flow chart. | | CO5 | | An | 5 |
| 27. | Write the scientific name & chromosome number and explain about the floral biology of sorghum. | | CO6 | | U | 5 |
| 28. | Differentiate Quantitative and Qualitative traits. | | CO1 | | An | 5 |
| 29. | How will you transfer a dominant disease resistant gene into a cultivated background? | | CO2 | | An | 5 |
| 30. | Write the major breeding objectives in cotton. | | CO3 | | An | 5 |
| 31. | Describe the floral biology of cucumber and mention its scientific name, origin and chromosome number. | | CO4 | | U | 5 |
| 32. | Explain about the *ex-situ* conservation strategies. | | CO5 | | An | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Mention the scientific name, origin and chromosome number of five *kharif* cereal crops and What is pedigree selection? | CO6 | | An | 5 |
|  | b. | Describe the crossing techniques practiced in Maize. | CO6 | | An | 10 |
| 34. | a. | Differentiate *In-situ* and *Ex-situ* conservation methods. | CO2 | | A | 8 |
|  | b. | Define heritability & genetic advance and how to estimate Genetic advance and give interpretations. | CO2 | | A | 7 |
| 35. | a. | Explain about the Gene pool concept with its types. | CO2 | | R | 8 |
|  | b. | Describe the breeding trials involved in the release of varieties with flow charts. | CO2 | | R | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Remember the origin and diversity of different crops, components of inheritance and various crop improvement techniques. |
| CO2 | Understand the genetics of qualitative and quantitative characters. |
| CO3 | Remember different breeding procedures for genetic improvement of *kharif* crops. |
| CO4 | Evaluate the adaptability, stability, quality parameters, biotic and abiotic stress of various *kharif* crops, |
| CO5 | Utilize hybrid seed production techniques in cultivation *of kharif* crops |
| CO6 | Design and conduct field experiments to analyze the quality characters of donor parents |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | 2 |  | 10 | - | - | 17 |
| CO2 | 16 | 9 | 15 | 5 | - | - | 45 |
| CO3 | 2 | 2 | - | 10 | - | - | 14 |
| CO4 | 1 | 13 | - | - | - | - | 14 |
| CO5 | - | - | - | 15 | - | - | 15 |
| CO6 |  | 5 | - | 15 |  |  | 20 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2020** | **Duration** | **3hrs** |
| **Course Name** | **MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | What is the nitrogen content in Farmyard manure? | | CO2 | R | | 1 |
| 2. | Define Integrated nutrient management. | | CO4 | U | | 1 |
| 3. | Deficiency symptom of Zn in rice is called as \_\_\_\_\_\_\_\_\_. | | CO2 | An | | 1 |
| 4. | Define Nitrification. | | CO3 | U | | 1 |
| 5. | Which nutrient is responsible for luxury consumption? | | CO2 | A | | 1 |
| 6. | Define straight fertilizer. | | CO4 | U | | 1 |
| 7. | What is N and P2O5 percentage in DAP? | | CO2 | R | | 1 |
| 8. | Which element is highly immobile in soil? | | CO2 | R | | 1 |
| 9. | What is C:N ratio? | | CO1 | A | | 1 |
| 10. | Reddening in cotton is due to the deficiency of\_\_\_\_\_\_\_\_\_ in plants. | | CO2 | R | | 1 |
| 11. | Give example for amide form of fertilizer. | | CO1 | R | | 1 |
| 12. | List out the secondary nutrients. | | CO2 | A | | 1 |
| 13. | Nutrient element is responsible for plant’s root development. | | CO3 | U | | 1 |
| 14. | \_\_\_\_\_\_\_\_ is a complex water-soluble fertilizer being recommended for drip fertigation. | | CO2 | R | | 1 |
| 15. | Write two examples each for bulky organic manures and concentrated organic manures. | | CO2 | R | | 1 |
| 16. | Whip tail of cauliflower is due to the deficiency of \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 17. | \_\_\_\_\_\_\_\_\_\_ instrument is used to determine K in soils. | | CO5 | R | | 1 |
| 18. | Gypsum supplies \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ plant nutrients. | | CO6 | U | | 1 |
| 19. | Blossom end rot is caused due to the deficiency of \_\_\_\_\_\_\_\_\_ in tomato. | | CO2 | R | | 1 |
| 20. | Define green and green leaf manures. | | CO1 | A | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Enumerate the micronutrient deficiency in plants. | | CO1 | | A | 5 |
| 22. | Explain INM and its concepts in a brief manner. | | CO3 | | R | 5 |
| 23. | Give a detailed account on Nitrogenous fertilizers and its classification. | | CO4 | | U | 5 |
| 24. | Distinguish between organic manures and fertilizers with suitable examples. | | CO1 | | R | 5 |
| 25. | Write down the reclamation procedures for different problematic soils. | | CO6 | | An | 5 |
| 26. | Write a note on Nano fertilizers. | | CO2 | | U | 5 |
| 27. | Write the mechanisms of nutrients transport to plant system. | | CO3 | | An | 5 |
| 28. | What is soil fertility? What is meant by essential plant nutrients? | | CO3 | | U | 5 |
| 29. | Write the importance of organic manures on soil fertility improvement. | | CO1 | | An | 5 |
| 30. | Describe the specific fertilizer application methods in a brief manner. | | CO4 | | A | 5 |
| 31. | Write down the physiological role of major nutrient in plant. | | CO1 | | An | 5 |
| 32. | What are known as plant nutrients? Write down three criteria for the essentiality of an element or nutrient. | | CO2 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Write an essay on the various methods of soil fertility evaluation. | CO4 | | An | 8 |
|  | b. | Write notes on deficiency and toxicity symptoms of essential plant nutrients and their corrective measures. | CO2 | | R | 7 |
| 34. | a. | Write down the classification, composition and properties of nitrogenous fertilizers. | CO4 | | R | 8 |
|  | b. | Describe the chemistry of N and P in soils. | CO2 | | U | 7 |
| 35. | a. | Write an essay on the various methods of fertilizers application under rain fed and irrigated conditions. | CO2 | | An | 8 |
|  | b. | Explain the classification, composition and properties of organic manures. | CO1 | | U | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the properties of manures, fertilizers and soil amendments. | | | | | | | |
| CO2 | Summarize the concepts of soil fertility and plant nutrition and chemistry of nutrients in soil. | | | | | | | |
| CO3 | Demonstrate Integrated Nutrient Management and fertilizer recommendation practices. | | | | | | | |
| CO4 | Evaluate the fertility of soil. | | | | | | | |
| CO5 | Analyze the plant nutrient content. | | | | | | | |
| CO6 | Recommend fertilizer dosage for different soil types. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 6 | 7 | 7 | 10 |  |  | 30 |
| CO2 | | 19 | 13 | 2 | 9 |  |  | 43 |
| CO3 | | 5 | 7 | 0 | 5 |  |  | 17 |
| CO4 | | 8 | 7 | 5 | 8 |  |  | 28 |
| CO5 | | 1 | 0 | 0 | 0 |  |  | 1 |
| CO6 | | 0 | 1 | 0 | 5 |  |  | 6 |
|  | | | | | | | | **125** |

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| **Course Code** | **18AG2021** | **Duration** | **3hrs** |
| **Course Name** | **DISEASES OF FIELD AND HORTICULTURAL CROPS AND THEIR MANAGEMENT- I** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Clipping of rice seedlings makes the seedlings susceptible to \_\_\_\_\_\_\_\_\_\_ disease. | | CO3 | R | | 1 |
| 2. | The disease which infects the boot leaf stage of rice crop \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 3. | The sclerotial stage of root rot pathogen is \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | Example of turnip shaped teliospore producing pathogen \_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 5. | Two kinds of spores produced by Phomopsis blight of brinjal \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 6. | Chlamydospore producing organism is \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 7. | The partial root parasite of Sorghum \_\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 8. | The virus which serve as a gene taxi \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 9. | Membrane of smut is \_\_\_\_\_\_\_\_\_\_. | | CO 2 | R | | 1 |
| 10. | The alternate host of sorghum rust \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 11. | Any one obligate pathogen you have studied \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 12. | Microsclerotia producing pathogen is \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 13. | Common antibiotic used for the control of *Phytoplasma* diseases \_\_\_\_\_\_\_\_\_\_. | | CO6 | An | | 1 |
| 14. | Enlargement of cabbage root is due to this process \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 15. | Name the vector that transmits tomato big bud \_\_\_\_\_\_\_\_\_\_. | | CO4 | R | | 1 |
| 16. | Khaira disease of Rice is caused by \_\_\_\_\_\_\_\_\_\_ deficiency. | | CO2 | R | | 1 |
| 17. | The causal organism of beans anthracnose \_\_\_\_\_\_\_\_\_\_. | | CO6 | R | | 1 |
| 18. | An antibiotic recommended for bacterial diseases \_\_\_\_\_\_\_\_\_\_. | | CO6 | R | | 1 |
| 19. | Example for viroid disease of coconut \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 20. | Any one soil borne disease with causal organism \_\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Explain how to prepare AVP for bud necrosis virus. | | CO6 | | E | 5 |
| 22. | List any two chlamydospore producing plant pathogens and their symptoms. | | CO2 | | U | 5 |
| 23. | Distinguish between Oidium, Oidiopsis powdery mildews infecting green gram and redgram respectively with example and neat diagrams. | | CO3 | | An | 5 |
| 24. | Management of pomegranate bacterial blight and rice bacterial blight. | | CO6 | | U | 5 |
| 25. | List the symptoms of Fusarialwilt , Verticillium wilt and Ralstonia wilt which cause economic loss in horticultural crops – Explain. | | CO3 | | C | 5 |
| 26. | Explain the symptoms, causal organism and management of sterility mosaic disease of pigeon pea and little leaf of brinjal. | | CO3 | | An | 5 |
| 27. | Differentiate the symptoms of Downy mildew of sorghum and cumbu. | | CO4 | | U | 5 |
| 28. | Discuss the favourable condition for the occurrence of root rot and wilt diseases in crop plants along with their management. | | CO3 | | An | 5 |
| 29. | Write the symptom and management of damping off disease of vegetable crops. | | CO6 | | E | 5 |
| 30. | Draw the acervuliand pycnidia and mark the parts. | | CO2 | | U | 5 |
| 31. | Differentiate early and late leaf spot of groundnut. | | CO2 | | R | 5 |
| 32. | Draw the life cycle of smut of Sorghum. | | CO2 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss the symptoms and management of guava wilt, pomegranate bacterial blight and papaya ring spot virus. | CO2 | | U | 7 |
|  | b. | List down the important diseases of coconut and elaborate the symptoms of any three important disease. | CO5 | | U | 8 |
| 34. | a. | Comment on the banana diseases which are air borne, soil borne and vector borne- draw diagrams. | CO3 | | U | 7 |
|  | b. | Recall any three rust infecting three different crops you have studied elaborating the symptoms causal organism and management. | CO6 | | U | 8 |
| 35. | a. | Summarize the symptom of Phytophthora blight of redgram and Colocassia with suitable diagrams. | CO3 | | U | 7 |
|  | b. | Elaborate white blister of crucifers and blister blight of Tea. | CO3 | | U | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Remember the factors responsible for disease development. |
| CO2 | Understand the importance of different plant pathogens with their characteristics and classification. |
| CO3 | Recall the reproduction, survival and transmission of plant pathogens. |
| CO4 | Outline the mode of dispersal, role of enzymes and toxins in disease development. |
| CO5 | Analyze defense mechanism in plants and the epidemiological factors. |
| CO6 | Apply knowledge on plant disease management. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | - | - | - | - | - | 2 |
| CO2 | 13 | 22 | - | - | - | - | 35 |
| CO3 | 4 | 24 | - | 15 | - | 5 | 48 |
| CO4 | 1 | 5 | - | - | - | - | 6 |
| CO5 | - | 8 | - | - | - | - | 8 |
| CO6 | 2 | 13 | - | 1 | 10 | - | 26 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2022** | **Duration** | **3hrs** |
| **Course Name** | **PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | Name the fungal bio-control agent. | | CO2 | R | 1 |
| 2. | The pathogen with low birth rate and only one genration during the crop season is known as \_\_\_\_\_\_\_\_\_. | | CO1 | U | 1 |
| 3. | Insecticide act was enforced in \_\_\_\_\_\_\_\_\_ year. | | CO2 | R | 1 |
| 4. | Name the fungicide used for soil drenching. | | CO2 | R | 1 |
| 5. | Give the expansion for EC. | | CO1 | U | 1 |
| 6. | The pest density where Marginal crop revenue is equal to the management action cost is \_\_\_\_\_\_\_\_\_. | | CO1 | U | 1 |
| 7. | Destructive Insects and Pests Act came into force in the year \_\_\_\_\_\_\_. | | CO6 | R | 1 |
| 8. | What is PRA? | | CO3 | U | 1 |
| 9. | Give an example for insect predator. | | CO2 | R | 1 |
| 10. | National Centre for Integrated Pest Management (NCIPM) is located at \_\_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 11. | *Trichogramma* is \_\_\_\_\_\_\_\_\_ parasitoid. | | CO2 | R | 1 |
| 12. | Ability of a plant to grow and yield despite of pest attack is \_\_\_\_\_\_\_\_\_. | | CO2 | U | 1 |
| 13. | Prediction of severity of pest population which can cause economic damage to the crop is \_\_\_\_\_\_\_\_\_. | | CO4 | U | 1 |
| 14. | Pest population that produces incremental damage equal to the cost of preventing the damage is \_\_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 15. | In \_\_\_\_\_\_\_\_\_ forecasting, data are recorded over a number of years on wide seasonal range and from different areas. | | CO5 | U | 1 |
| 16. | What is epidemic pest? Mention any one example. | | CO1 | R | 1 |
| 17. | Define: ETL. | | CO2 | U | 1 |
| 18. | Expand: DPPQ&S. | | CO6 | R | 1 |
| 19. | What is Phytosanitary certificate? | | CO3 | U | 1 |
| 20. | The use of light traps is a \_\_\_\_\_\_\_\_\_ method of IPM. | | CO2 | U | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | Define the following  a. Epidemic b. Antibiotic c. Antisporulant d. Quarantine e.Resistance. | | CO1 | An | 5 |
| 22. | Explain about the fungicides based on general use with examples. | | CO2 | U | 5 |
| 23. | Write in detail about any five different types of morphological resistance. | | CO2 | An | 5 |
| 24. | Write about the safety issues in pesticide uses. | | CO3 | U | 5 |
| 25. | Define the following terms: i) Sporadic pests ii) Economic Injury Level iii) Fumigant iv) GEP  v) Plant quarantine. | | CO2 | An | 5 |
| 26. | Differentiate:  a) Short term and long term forecasting.  b) Infectious and Non-infectious disease. | | CO4 | U | 5 |
| 27. | Discuss the ecological management of crop environment. | | CO3 | An | 5 |
| 28. | Summarize the political, social and legal implications of IPM. | | CO6 | U | 5 |
| 29. | Define- mechanical control and give in brief about mechanical control methods with examples. | | CO2 | An | 5 |
| 30. | Differentiate: Predator and Parasitoid. | | CO3 | U | 5 |
| 31. | What are the different types of pest survey? And explain them. | | CO4 | An | 5 |
| 32. | Write in detail about the conventional pesticides for the insect pests’ management. | | CO3 | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Classification of plant diseases based on causes of the diseases. | CO1 | An | 8 |
|  | b. | Explain the survey surveillance and forecasting of plant diseases. | CO6 | U | 7 |
| 34. | a. | Write in detail on classification of insecticides with examples. | CO2 | An | 8 |
|  | b. | Explain the various methods of cultural control used in IPM, with suitable examples. | CO2 | U | 7 |
| 35. | a. | What is HPR? Explain the mechanisms of HPR with suitable examples. | CO2 | An | 8 |
|  | b. | Explain in detail about biological control methods for insect pest management. | CO3 | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Remember the important concepts and principles of Integrated pest and disease management practices. |
| CO2 | Understand and demonstrate the various tools of IPM - Cultural, Mechanical, Physical, Biological, Legal and Chemical control. |
| CO3 | Apply the knowledge to develop Integrated pest and disease management strategies. |
| CO4 | Analyze the pest outbreak through pest monitoring, forecasting and surveillance methods. |
| CO5 | Create the awareness among farmers about the importance of IPM and help them to implement the suitable IPM practices based on AESA. |
| CO6 | Evaluate the political, social, and legal implication of implemented IPM. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 3 | - | 2 | - | - | 6 |
| CO2 | 5 | 5 | - | 9 | - | - | 19 |
| CO3 | 10 | 30 | - | 5 | - | - | 45 |
| CO4 | - | 10 | - | 8 | - | - | 18 |
| CO5 | - | 7 | - | - | - | - | 7 |
| CO6 | 15 | 15 | - | - | - | - | 30 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2023** | **Duration** | **3hrs** |
| **Course Name** | **PESTS OF CROPS AND STORED GRAINS AND THEIR MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Name the insect pest which causes ‘white ear’ in rice crop. | | CO2 | U | | 1 |
| 2. | Name the egg parasitoid of early shoot borer of sugarcane. | | CO3 | R | | 1 |
| 3. | The Scientific name of maize cob worm \_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | Red gram sterility mosaic virus is transmitted by \_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 5. | Name the pest that occur both in the field and storage of sweet potato | | CO1 | U | | 1 |
| 6. | Central spindle appears cut or toppled in coconut is a symptom of \_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 7. | Pink colouration on apple fruit is due to the attack of \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 8. | Cattle grazed appearance in the groundnut field is a symptom of \_\_\_\_\_\_\_\_ attack. | | CO2 | R | | 1 |
| 9. | *Helicoverpa armigera* belongs to \_\_\_\_\_\_\_\_ family. | | CO1 | U | | 1 |
| 10. | Write the scientific name of cardamom thrips. | | CO1 | U | | 1 |
| 11. | Pepper berries are hollow and crumble when pressed is a typical symptom of \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 12. | Write the scientific name of Anar butterfly. | | CO1 | R | | 1 |
| 13. | Name the insect pest in mango that results in fruit drop and liquid oozing out upon pressing. | | CO2 | R | | 1 |
| 14. | Citrus butterfly belongs to which family. | | CO1 | R | | 1 |
| 15. | Bunchy top of the banana is transmitted by \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 16. | Write the scientific name of Chickoo moth. | | CO1 | R | | 1 |
| 17. | Blisters and corky growth on guava fruit is due to the attack of \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 18. | Name the site of pupation of fruit flies | | CO1 | R | | 1 |
| 19. | \_\_\_\_\_\_\_\_ larva attacks buds which are webbed together by silken threads on jasmine. | | CO2 | U | | 1 |
| 20. | Presence of white or creamy white nymphs and adults inside the marginal galls of pepper is the typical symptom of attack by \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Discuss in brief about the bionomics and symptom of apple wooly aphid and san Jose scale. | | CO3 | | An | 5 |
| 22. | Brief about the types of damage caused by insect pests. | | CO5 | | U | 5 |
| 23. | Discuss the major pests of coconut and their management. | | CO2 | | An | 5 |
| 24. | Enlist the insect pest of cucurbitaceous plants and describe the nature of damage and management. | | CO3 | | U | 5 |
| 25. | Discuss in brief about potato tuber moth and sweet potato weevil. | | CO2 | | An | 5 |
| 26. | Enlist the pests of rose and describe the damage symptom. | | CO3 | | U | 5 |
| 27. | Enumerate any three major pests of guava and their management. | | CO3 | | An | 5 |
| 28. | Enlist the major insect pests of moringa and write the management practices. | | CO3 | | U | 5 |
| 29. | Mention the mites attacking tea crops with their nature of damage and management. | | CO3 | | An | 5 |
| 30. | List out the major pests of citrus and write the management practices. | | CO3 | | U | 5 |
| 31. | Enlist the major pest of grapevine and discuss the nature of damage and management practices. | | CO2 | | An | 5 |
| 32. | Discuss the common IPM practices followed against fruit flies. | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Describe the binomics of bollworms in cotton and explain in detail the nature of damage and management practices. | CO3 | | An | 8 |
|  | b. | Brief about the pests of mulberry and green manures and their management. | CO2 | | U | 7 |
| 34. | a. | Explain the major pests of groundnut and sunflower and their management. | CO3 | | U | 8 |
|  | b. | Write the major pests of brinjal and bhendi in detail. | CO2 | | An | 7 |
| 35. | a. | Brief about the pests of sugarcane and their management. | CO2 | | U | 7 |
|  | b. | Enumerate the primary feeders of stored grains pests and IPM for stored pests. | CO5 | | An | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Remember morphology and taxonomic characteristics of insect pests affecting crops and stored grains. |
| CO2 | Understand nature and type of damage by different arthropod pests in field, vegetable, fruit and plantation crops, ornamental crops, spices and condiments. |
| CO3 | Analyze factors influencing pest occurrence, distribution and control measures. |
| CO4 | Summarize factors affecting losses of stored grain. |
| CO5 | Analyze the role of various factors in deterioration of grain and their management strategies. |
| CO6 | Recommend pest management measures to resource poor farmers. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | 3 | - | - | - | - | 8 |
| CO2 | 4 | 21 | - | 22 | - | - | 47 |
| CO3 | 1 | 28 | - | 23 | - | - | 52 |
| CO4 | - | - | - | - | - | - | - |
| CO5 | - | 5 | - | 8 | - | - | 13 |
| CO6 | - | 5 | - | - | - | - | 5 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2025** | **Duration** | **3hrs** |
| **Course Name** | **ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | Name the French verb from which “Entrepreneur” is derived from? | | CO1 | R | 1 |
| 2. | What is "NIESBUD"? | | CO2 | R | 1 |
| 3. | What is "T" stands for in SWOT analysis? | | CO5 | R | 1 |
| 4. | Who is eligible to receive National Entrepreneurship Awards (NEA)? | | CO2 | R | 1 |
| 5. | Name the initial funding required to start the operations of a new business? | | CO2 | R | 1 |
| 6. | When startup India Programme has been launched in India? | | CO2 | R | 1 |
| 7. | Find the scheme in which new-entrants are granted a tax-holiday (tax exemption) for three years.? | | CO2 | R | 1 |
| 8. | Which scheme was launched by Prime Minister in September 25, 2014? | | CO2 | R | 1 |
| 9. | What is PMMY? | | CO2 | R | 1 |
| 10. | Name the scheme where Shishu, Kishore, Tarun loan systems comes? | | CO2 | R | 1 |
| 11. | Which Economy model is followed in India? | | CO4 | R | 1 |
| 12. | What qualifies as a start up in Indian context? | | CO1 | R | 1 |
| 13. | Which financial statement shows the firm’s assets and liabilities? | | CO6 | R | 1 |
| 14. | Which is the discount rate at which the Net Present Value (NPV) for a project equals 0? | | CO6 | R | 1 |
| 15. | What is ISO stands for in terms of a company’s quality assurance? | | CO3 | R | 1 |
| 16. | What is TQM? | | CO3 | R | 1 |
| 17. | What is privatization? | | CO4 | R | 1 |
| 18. | What is called as EOQ? | | CO3 | R | 1 |
| 19. | When a person is motivated by his internal desires, then that motivation is called as \_\_\_\_\_. | | CO3 | R | 1 |
| 20. | Choose the reward for all the efforts of an entrepreneur?   1. Profit b. Salary c. Rent d. Interest | | CO3 | A | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | Explain the objectives of entrepreneurship development program. | | CO1 | E | 5 |
| 22. | List the types of entrepreneur. | | CO1 | An | 5 |
| 23. | What are all the managerial skills required for the entrepreneurs? | | CO1 | R | 5 |
| 24. | Explain the three products of Mudra Scheme. | | CO2 | E | 5 |
| 25. | Explain the types of motivation. | | CO3 | E | 5 |
| 26. | Outline the characteristics of Entrepreneurs. | | CO1 | U | 5 |
| 27. | Discuss in detail SWOT analysis. | | CO5 | C | 5 |
| 28. | Explain the steps in entrepreneurship process. | | CO2 | U | 5 |
| 29. | Differentiate managers and entrepreneurs. | | CO1 | An | 5 |
| 30. | List few entrepreneurial opportunities in Agriculture. | | CO2 | An | 5 |
| 31. | Discuss the various contents of project report. | | CO6 | C | 5 |
| 32. | How to determine the economic efficiency of a project? Explain. | | CO6 | E | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Explain in detail the role of entrepreneur in economic development | CO3 | E | 7.5 |
|  | b. | Explain financing of enterprise. | CO1 | U | 7.5 |
| 34. | a. | Explain supply chain management. | CO3 | U | 7.5 |
|  | b. | Elaborate the steps taken by government for entrepreneurship development in India. | CO3 | C | 7.5 |
| 35. | a. | Explain the different phases of Entrepreneurship development programme. | CO3 | E | 7.5 |
|  | b. | Explain in detail the Total Quality Management (TQM). | CO1 | U | 7.5 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Distinguish different entrepreneurial traits and skills. | | | | | | | |
| CO2 | Know the agribusiness opportunities open for agriculture graduates. | | | | | | | |
| CO3 | Apply the leadership skills to get financial support for start-ups. | | | | | | | |
| CO4 | Understand the impact of economic reforms in agri-business. | | | | | | | |
| CO5 | Perform SWOT analysis of an entity for any prospective agribusiness/ideas. | | | | | | | |
| CO6 | Formulate business proposal for successful implementation of the business plan | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 7 | 20 | - | 10 | 5 | - | 42 |
| CO2 | | 8 | 5 | - | 5 | 5 | - | 23 |
| CO3 | | 4 | 7.5 | 1 | - | 20 | 7.5 | 40 |
| CO4 | | 2 | - | - | - |  | - | 2 |
| CO5 | | 1 | - | - | - | - | 5 | 6 |
| CO6 | | 2 | - | - | - | 5 | 5 | 12 |
|  | | | | | | | | **125** |

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| **Course Code** | **18AG2026** | **Duration** | **3hrs** |
| **Course Name** | **INTELLECTUAL PROPERTY RIGHTS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | | |
| 1. | Which was the first multilateral free trade agreement? | | | CO1 | R | | | 1 |
| 2. | Which is the only global international organization dealing with the rules of trade between nations? | | | CO1 | R | | | 1 |
| 3. | Mention the agreement, which is legal recognition of the significance of links between intellectual property and trade. | | | CO1 | R | | | 1 |
| 4. | What is meant by industrial design? | | | CO2 | U | | | 1 |
| 5. | When the Budapest Treaty has been signed? | | | CO2 | R | | | 1 |
| 6. | Which convention deals with the protection of works and the rights of their authors? | | | CO2 | R | | | 1 |
| 7. | Which is the most convenient and cost-effective solution for registering trademarks worldwide? | | | CO3 | R | | | 1 |
| 8. | The European Patent Office is one of the national patent offices that grants patents. True/False | | | CO3 | R | | | 1 |
| 9. | How to protect industrial design? | | | CO6 | U | | | 1 |
| 10. | How many years the registration of the design is valid.  a.10 b.20. c.30. d.40 | | | CO4 | U | | | 1 |
| 11. | What is CBD? | | | CO4 | U | | | 1 |
| 12. | What is meant by "integrated circuits"? | | | CO6 | R | | | 1 |
| 13. | Expand SICLDR. | | | CO5 | U | | | 1 |
| 14. | Name the person who recommended patent Act. | | | CO5 | U | | | 1 |
| 15. | What is meant by "pre-grant opposition" to a patent | | | CO6 | R | | | 1 |
| 16. | Expand UPOV. | | | CO6 | R | | | 1 |
| 17. | Mention two examples of tangible and intangible benefits. | | | CO6 | U | | | 1 |
| 18. | WTO origins began with trade negotiations after World War I.  True/False | | | CO1 | R | | | 1 |
| 19. | Define copyright. | | | CO2 | U | | | 1 |
| 20. | Give some examples of GI. | | | CO4 | R | | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | | |
| 21. | What are the three main provisions of GATT for its member countries? | | | CO1 | | An | | 5 |
| 22. | Write about the history of the WTO. | | | CO2 | | U | | 5 |
| 23. | What are the five broad areas covered under TRIPS? | | | CO3 | | An | | 5 |
| 24. | Write a short note on WIPO. | | | CO2 | | U | | 5 |
| 25. | Discuss in brief the treaty that is recognized for the deposit of microorganisms. | | | CO2 | | An | | 5 |
| 26. | Explain in detail the Berne Convention. | | | CO2 | | U | | 5 |
| 27. | Distinguish tangible and intangible benefits elaborately. | | | CO1 | | An | | 5 |
| 28. | What role do patents play in everyday life? | | | CO2 | | An | | 5 |
| 29. | Who grants patents, and what rights does copyright provide? | | | CO3 | | U | | 5 |
| 30. | Why to protect industrial design, and how can it be protected? | | | CO4 | | U | | 5 |
| 31. | Write down the different phases of the PCT system along with its application procedure. | | | CO5 | | An | | 5 |
| 32. | Elaborately discuss the Patent Act of 1970. | | | CO6 | | U | | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | | |
| 33. | a. | What is the difference between a geographical indication and a trademark? Write in brief how geographical indications are protected. | CO1 | | U | | 7.5 | |
|  | b. | Write a brief note on Integrated Circuit and layout design for the IC in India. |  | |  | | 7.5 | |
| 34. | a. | Discuss in detail the criteria that can determine the innovations that can be patented in India. | CO2 | | An | | 7.5 | |
|  | b. | Give a detailed note on product patents and the procedures for filing patents. |  | |  | | 7.5 | |
| 35. | a. | Narrate India’s heritage in traditional knowledge and mention three popular cases that brought the legacy of Indian TK to light. | CO4 | | An | | 7.5 | |
|  | b. | Discuss in detail the convention of biological diversity. |  | |  | | 7.5 | |

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|  | **COURSE OUTCOMES** |
| CO1 | Understanding GATT, WTO, TRIPs, and WIPO for IPR protection. |
| CO2 | Now how to acquire the patent and copyright for their innovative work. |
| CO3 | Remember plagiarism, which can be questioned legally. |
| CO4 | Explain the UPOV, PPV, and Farmers Rights Acts of India. |
| CO5 | Apply, analyze, and use ITK strategies. |
| CO6 | To achieve new innovative goals of IPR |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 4 | 15 | - | 10 | - | - | 29 |
| CO2 | 2 | 17 | - | 25 | - | - | 44 |
| CO3 | 2 | 5 | - | 5 | - | - | 12 |
| CO4 | 1 | 12 | - | 15 | - | - | 23 |
| CO5 | - | 2 | - | 5 | - | - | 7 |
| CO6 | 3 | 7 | - | - | - | - | 10 |
|  | | | | | | | **125** |

**Graphical user interface, application

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| **Course Code** | **18AG2027** | **Duration** | **3hrs** |
| **Course Name** | **RAINFED AGRICULTURE AND WATERSHED MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Define percolation pond. | | CO5 | R | | 1 |
| 2. | Expand the term “LCC”. | | CO6 | U | | 1 |
| 3. | Define seed hardening. | | CO3 | U | | 1 |
| 4. | List out the advantages of micro catchments in dry farming areas. | | CO3 | U | | 1 |
| 5. | The MDU 10 variety is the example for \_\_\_\_\_\_\_ crop. | | CO4 | R | | 1 |
| 6. | The annual rainfall of India is about \_\_\_\_\_\_\_ mm. | | CO4 | R | | 1 |
| 7. | The drought as a situation occurring in any area where the annual rainfall is less than \_\_\_\_\_\_\_ % of normal rainfall. | | CO1 | R | | 1 |
| 8. | Define Agroforestry. | | CO6 | U | | 1 |
| 9. | The kaolin is recommended for \_\_\_\_\_\_\_. | | CO3 | A | | 1 |
| 10. | Expand the term “CRIDA”. | | CO1 | R | | 1 |
| 11. | Define vertical mulching. | | CO3 | R | | 1 |
| 12. | The Contour bund is recommended for \_\_\_\_\_\_\_ type of soil. | | CO1 | R | | 1 |
| 13. | Define water harvesting. | | CO6 | R | | 1 |
| 14. | Define double cropping. | | CO5 | U | | 1 |
| 15. | Define non-monetary inputs. | | CO5 | R | | 1 |
| 16. | Define CA. | | CO3 | R | | 1 |
| 17. | ICRISAT located at \_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 18. | Define chisel plough. | | CO1 | R | | 1 |
| 19. | Define mixed cropping. | | CO3 | R | | 1 |
| 20. | Define Aridity. | | CO2 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Write about Broad bed furrows and contour bunds with neat diagram. | | CO5 | | A | 5 |
| 22. | Explain midseason correction under dry land crop production. | | CO4 | | A | 5 |
| 23. | How to select the crops and varieties in dry farming regions? | | CO3 | | U | 5 |
| 24. | Write about factors affecting nutrient use efficiency in dry lands. | | CO4 | | U | 5 |
| 25. | Discuss different types of tree culture in water limiting regions. | | CO5 | | U | 5 |
| 26. | Explain labour management in dry farming areas. | | CO3 | | A | 5 |
| 27. | Discuss major crops of dry lands in India and Tamil Nadu. | | CO1 | | U | 5 |
| 28. | Explain in brief the arid and semiarid regions in India. | | CO1 | | R | 5 |
| 29. | Differentiate the dry farming, dry land farming and rainfed farming. | | CO2 | | U | 5 |
| 30. | Discuss various important seed sowing implements used in dry farming regions. | | CO5 | | A | 5 |
| 31. | Give the detailed information about low cost technologies in dry land crop production. | | CO5 | | A | 5 |
| 32. | Discuss various types of drought and its characters. | | CO2 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss Integrated dry Land Technologies to improve the sustainability of dry farming areas. | CO5 | | U | 8 |
|  | b. | Explain water harvesting, recycling and storage for water limiting environment. | CO5 | | U | 7 |
| 34. | a. | Explain watershed management approach (principles, aims, and classification and action plan). | CO5 | | U | 8 |
|  | b. | Give the contingency crop plan for important drought tolerant crops. | CO2 | | U | 7 |
| 35. | a. | Write an elaborated note on antitranspirant – its types, roles and advantages with examples. | CO4 | | U | 7 |
|  | b. | Explain the characteristics and the major constraints in dry land farming. | CO1 | | U | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand sustainable agriculture practices under rainfed conditions. |
| CO2 | Remember soil and climatic conditions of rainfed areas. |
| CO3 | Explain the various crop management techniques and the adaptation strategies for dry land agriculture. |
| CO4 | Formulate contingent water planning for aberrant weather conditions. |
| CO5 | Apply knowledge of different water conservation methods and effective water utilization through use of watershed management. |
| CO6 | Simulate artificial hydrologic watersheds and manage the watersheds effectively. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 | 13 | - | - | - | - | 23 |
| CO2 | 6 | 12 | - | - | - | - | 18 |
| CO3 | 3 | 7 | 6 | - | - | - | 16 |
| CO4 | 2 | 12 | 5 | - | - | - | 19 |
| CO5 | 2 | 29 | 15 | - | - | - | 46 |
| CO6 | 1 | 2 | - | - | - | - | 3 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2030** | **Duration** | **3hrs** |
| **Course Name** | **DISEASES OF FIELD AND HORTICULTURAL CROPS AND THEIR MANAGEMENT - II** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Write the causal organism of wheat stem rust \_\_\_\_\_\_\_\_\_\_. | | CO1 | U | | 1 |
| 2. | Tiger claw effect is a diagnostic symptom of \_\_\_\_\_\_\_\_\_\_ disease. | | CO2 | R | | 1 |
| 3. | Name the biocontrol agent used for seed treatment \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | Find the source of primary infection for *Fusarium* wilt of Bengal gram \_\_\_\_\_\_\_\_\_\_. | | CO1 | An | | 1 |
| 5. | Name the vector for grassy shoot of sugarcane \_\_\_\_\_\_\_\_\_\_. | | CO1 | U | | 1 |
| 6. | Typical symptom of apple scab disease is \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 7. | Define macrocyclic rust. | | CO2 | U | | 1 |
| 8. | Give the typical damage symptom for Whip smut of sugarcane \_\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 9. | Recall the collateral host for red rot of sugarcane. | | CO1 | R | | 1 |
| 10. | Name the selective fungicides used for rust and smut diseases of wheat \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 11. | List out any two diseases in grapevine \_\_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 12. | Fire Blight of apple is caused by \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 13. | Write the typical symptom of red rot of sugarcane \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 14. | Name the vector for chilli leaf curl disease \_\_\_\_\_\_\_\_\_\_. | | CO1 | An | | 1 |
| 15. | Write the causal organism of mango anthracnose \_\_\_\_\_\_\_\_\_\_. | | CO3 | An | | 1 |
| 16. | Explain the typical symptom of citrus canker. | | CO1 | R | | 1 |
| 17. | Name any two viral diseases in field and horticultural crops \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 18. | Write the specific fungicide used to manage the powdery mildew disease \_\_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 19. | Which disease exhibits vein necrosis and black arm symptom in cotton? | | CO2 | An | | 1 |
| 20. | Early blight of tomato and potato caused by \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |  | **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** |
| 21. | Write the loose smut of wheat with neat diagrams and their management. | | CO1 | | An | 5 |
| 22. | Explain *Alternaria* leaf blight of sunflower. | | CO1 | | E | 5 |
| 23. | Distinguish the three species of *Puccinia* causing rust diseases in wheat. | | CO3 | | U | 5 |
| 24. | Explain the causal organism, symptoms and management of vascular wilt disease in cucumber. | | CO1 | | C | 5 |
| 25. | Elaborate the root rot of chickpea and their management. | | CO2 | | E | 5 |
| 26. | Write short notes on symptoms and integrated management practices for powdery mildew disease in apple. | | CO1 | | A | 5 |
| 27. | Explain viral diseases in chilli and their management. | | CO1 | | An | 5 |
| 28. | Write short notes on symptoms and integrated management practices for *Sclerotinia* stem rot of sunflower. | | CO2 | | E | 5 |
| 29. | Summarize Fusarium wilt in Cotton. | | CO2 | | A | 5 |
| 30. | Elaborate the anthracnose disease in mango with neat diagram and their management. | | CO3 | | E | 5 |
| 31. | Write the fire blight disease in apple and their management. | | CO3 | | C | 5 |
| 32. | Explain the pathogen characters, symptoms and management of stem gall in coriander. | | CO1 | | An | 5 |
| **PART – C (2 X 15 = 30 MARKS)(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain the powdery mildew and downy mildew diseases of grapes. | CO2 | | U | 8 |
|  | b. | Discuss the five important damage symptoms of bacterial blight of cotton with neat diagrams. Explain their mode of spread and integrated management practices. | CO5 | | U | 7 |
| 34. | a. | Elaborate the symptoms, mode of spread, disease cycle of *Puccinia tritici* causing wheat stem rust with neat diagrams and its integrated management practices. | CO3 | | U | 8 |
|  | b. | Write any two diseases of sugarcane and their management. | CO6 | | U | 7 |
| 35. | a. | Elaborate the symptoms, mode of spread, disease cycle of citrus canker with neat diagrams and its integrated management practices. | CO3 | | U | 8 |
|  | b. | Write any two important diseases of onion and their management. | CO3 | | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Recall various plant diseases and their causal organisms in major field and horticultural crops. |
| CO2 | Identify the sign and symptoms for detection and diagnosis of various plant diseases of field and horticultural crops. |
| CO3 | Determine the prevalence, epidemiology and factors affecting disease development. |
| CO4 | Comprehend the disease cycle of various plant diseases. |
| CO5 | Analyse the host pathogen interaction on disease development. |
| CO6 | Apply integrated management practices to control the diseases of field and horticultural crops. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | - | - | - | - | - | 2 |
| CO2 | 13 | 22 | - | - | - | - | 35 |
| CO3 | 4 | 24 | - | 15 | - | 5 | 48 |
| CO4 | 1 | 5 | - | - | - | - | 6 |
| CO5 | - | 8 | - | - | - | - | 8 |
| CO6 | 2 | 13 | - | 1 | 10 | - | 26 |
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| **Course Code** | **18AG2031** | **Duration** | **3hrs** |
| **Course Name** | **POST-HARVEST MANAGEMENT AND VALUE ADDITION OF FRUITS AND VEGETABLES** | **Max. Marks** | **100** |

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| **Q.**  **No.** | **Questions** | | **Course**  **Outcome** | **Bloom’s**  **Level** | | **Marks** |
| **PART– A(20 X1 =20 MARKS)** | | | | | | |
| 1. | What is sauerkraut? | | CO 3 | U | | 1 |
| 2. | Expand FSSAI. | | CO 6 | R | | 1 |
| 3. | Name the equipment used for measuring pectin content. | | CO 3 | R | | 1 |
| 4. | Lactic acid bacteria is important for the preparation of which product? | | CO 3 | R | | 1 |
| 5. | Give an example for a radioactive isotope used in food irradiation. | | CO 3 | R | | 1 |
| 6. | Give the FSSAI specification for fruit jam. | | CO 6 | A | | 1 |
| 7. | Name the process of removal of air from cans in canning. | | CO 3 | A | | 1 |
| 8. | Which chemical is used in lye peeling? | | CO 3 | R | | 1 |
| 9. | Give an example for a class I preservative. | | CO 3 | R | | 1 |
| 10. | List the reason for weeping of jelly. | | CO 3 | R | | 1 |
| 11. | Name the equipment used for measuring fruit firmness. | | CO 2 | R | | 1 |
| 12. | Tell the other name for cold sterilization. | | CO 3 | A | | 1 |
| 13. | Partially fermented tea is called \_\_\_\_\_\_\_\_\_\_ | | CO 5 | R | | 1 |
| 14. | Name a pectin rich fruit from which jelly can be prepared. | | CO 3 | U | | 1 |
| 15. | Give an example for aseptic package. | | CO 5 | R | | 1 |
| 16. | Name the enzymes responsible for browning in fruits and vegetables. | | CO 2 | A | | 1 |
| 17. | Give the minimum TSS specified by FSSAI for RTS beverage. | | CO 3 | R | | 1 |
| 18. | Write the processing temperature for canned vegetable. | | CO 2 | U | | 1 |
| 19. | Who is known as father of canning? | | CO 3 | R | | 1 |
| 20. | Name the precursor of ethylene. | | CO 2 | R | | 1 |
| **PART– B(10 X5 =50MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | List the different food laws. | | CO 6 | An | | 5 |
| 22. | What is minimal processing? | | CO 5 | U | | 5 |
| 23. | Give the three types of non enzymatic browning in food products. | | CO 2 | U | | 5 |
| 24. | Discuss about secondary processing in cocoa. | | CO 5 | | A | 5 |
| 25. | Describe different freezing methods followed in fruits and vegetables. | | CO 4 | | U | 5 |
| 26. | Give a brief account of Zero Energy Cool Chamber. | | CO 5 | | A | 5 |
| 27. | Enumerate different storage methods for horticultural crops. | | CO 5 | | A | 5 |
| 28. | Elaborate the different stages in processing of tea. | | CO 5 | | C | 5 |
| 29. | Differentiate between sterilization and pasteurization. | | CO 5 | | An | 5 |
| 30. | Write a note on vacuum packaging. | | CO 5 | | A | 5 |
| 31. | Comment on any five chemical preservatives used in food. | | CO 3 | | A | 5 |
| 32. | Define canning. Describe the different steps involved in can line. | | CO 3 | | An | 5 |
| **PART– C(2 X15 =30MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Write the principles of food preservation. | CO 1 | | A | 7.5 |
|  | b. | Explain different methods of food preservation. | CO 1 | | An | 7.5 |
| 34. | a. | Give a brief account of shrink wrap packaging and aseptic packaging. | CO 5 | | An | 7.5 |
|  | b. | Distinguish between modified atmospheric packaging and controlled atmospheric packaging. | CO 5 | | U | 7.5 |
| 35. | a. | Give an account of different post-harvest treatments followed in horticultural crops. | CO 4 | | A | 7.5 |
|  | b. | Write a note on food irradiation, its principle, advantages and disadvantages. | CO 4 | | R | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Remember the different post-harvest management of important fruits and vegetables. |
| CO2 | Understand the factors causing post-harvest losses in fruits and Vegetables. |
| CO3 | Explain about the different value addition process of important fruits and vegetables. |
| CO4 | Analyze the market, demand and supply chain for important fruits and vegetables. |
| CO5 | Recommend suitable storage structures and packaging methods for postharvest management of fruits and vegetables. |
| CO6 | Demonstrate knowledge about the different government schemes and laws in import and export of fruits and vegetables. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO/P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | - | - | 7 | 8 | - | - | 15 |
| CO2 | 2 | 6 | 1 | - | - | - | 9 |
| CO3 | 8 | 2 | 2 | 5 | - | - | 17 |
| CO4 | - | 5 | - | - | - | - | 5 |
| CO5 | 2 | 13 | 20 | 12 | - | 5 | 52 |
| CO6 | 1 | - | 1 | - | - | - | 2 |
|  | | | | | | | **100** |

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| **Course Code** | **18AG2032** | **Duration** | **3hrs** |
| **Course Name** | **CROP IMPROVEMENT-II (RABI CROPS)** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Write the scientific name, chromosome number and origin of Horse gram. | | CO1 | R | | 1 |
| 2. | What are the modes of asexual reproduction in crops? | | CO1 | R | | 1 |
| 3. | The seeds of sugarcane are known as \_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | The donor for D genome in wheat is \_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 5. | Give examples for allopolyploid crops. | | CO1 | R | | 1 |
| 6. | What is Pureline and who gave the concept of pureline? | | CO2 | U | | 1 |
| 7. | Mention the Scientific name and chromosome number of any two rabi vegetables. | | CO2 | U | | 1 |
| 8. | \_\_\_\_\_\_\_\_\_ is known as the queen of forage crops. | | CO2 | U | | 1 |
| 9. | F1 is known as a segregating generation (True/False). | | CO2 | U | | 1 |
| 10. | \_\_\_\_\_\_\_\_\_ proposed the concept of Ideotype. | | CO2 | U | | 1 |
| 11. | Define protandry and protogyny. | | CO3 | A | | 1 |
| 12. | What is inbreeding depression? | | CO3 | A | | 1 |
| 13. | Mention the cross-pollinating rabi crops. | | CO3 | A | | 1 |
| 14. | Individual Plant Progeny row selection is a feature of bulk breeding (True/False). | | CO3 | A | | 1 |
| 15. | ICRISAT is situated at \_\_\_\_\_\_\_\_\_. | | CO3 | A | | 1 |
| 16. | What are the abiotic and biotic stresses in crops? | | CO4 | An | | 1 |
| 17. | \_\_\_\_\_\_\_\_\_ gave the concept of center of origin. | | CO4 | An | | 1 |
| 18. | Focus on usage and conservation of recently released varieties results in a narrow genetic base (True/False). | | CO4 | An | | 1 |
| 19. | \_\_\_\_\_\_\_\_\_ is an allohexaploid rabi cereal. | | CO5 | An | | 1 |
| 20. | \_\_\_\_\_\_\_\_\_ is the chromosome number and \_\_\_\_\_\_\_\_\_ is the origin of Potato. | | CO5 | An | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Define Heritability and Genetic Advance. | | CO4 | | E | 5 |
| 22. | Briefly describe Ex-situ conservation of the plant genetic resources. | | CO4 | | E | 5 |
| 23. | Describe the emasculation and hybridization techniques in chickpea. | | CO4 | | E | 5 |
| 24. | What are primary and secondary centers of origin? | | CO4 | | E | 5 |
| 25. | Explain the concept of microcenter. | | CO4 | | E | 5 |
| 26. | Describe the evolution of wheat with flow chart. | | CO1 | | U | 5 |
| 27. | Write the floral biology of Tomato and mention its scientific name and chromosome number. | | CO1 | | U | 5 |
| 28. | Differentiate Quantitative and Qualitative traits. | | CO3 | | U | 5 |
| 29. | Write the difference between orthodox and recalcitrant seeds. | | CO3 | | C | 5 |
| 30. | Write the major breeding objectives in Sunflower. | | CO5 | | C | 5 |
| 31. | Describe the floral biology of Safflower and mention its scientific name, origin and chromosome number. | | CO5 | | A | 5 |
| 32. | Explain the Base, Active and Working collection in conservation. | | CO5 | | A | 5 |
| **PART – C (2 X 15 = 30 MARKS**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Mention the scientific name, origin, and chromosome number of Sugarcane and what is clonal selection? | CO6 | | An | 5 |
|  | b. | Describe the crossing techniques practiced in sugarcane. | CO6 | | An | 10 |
| 34. | a. | Differentiate *In-situ* and *Ex-situ* conservation methods. | CO2 | | A | 8 |
|  | b. | Define heterosis and briefly write the different methods involved in the estimation of heterosis. | CO2 | | A | 7 |
| 35. | a. | What is a Gene Pool and explain its types. | CO2 | | R | 8 |
|  | b. | Describe the breeding methods involved in the production of varieties with flow charts. | CO2 | | R | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Remember the origin and diversity of different crops, components of inheritance and various crop improvement techniques. |
| CO2 | Understand different breeding techniques for the genetic improvement in rabi crops. |
| CO3 | Evaluate the adaptability, stability, quality parameters, biotic and abiotic stresses of various rabi crops. |
| CO4 | Make use of hybrid seed production techniques in farming of rabi crops. |
| CO5 | Examine hybrid seed production methods. |
| CO6 | Apply the knowledge to develop climate resilient crop varieties. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | 10 |  |  |  |  | 15 |
| CO2 | 15 | 5 | 15 |  |  |  | 35 |
| CO3 |  | 5 | 5 |  |  | 5 | 15 |
| CO4 |  |  |  | 3 | 25 |  | 28 |
| CO5 |  |  | 10 | 2 |  | 5 | 17 |
| CO6 |  |  |  | 15 |  |  | 15 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2033** | **Duration** | **3hrs** |
| **Course Name** | **MANAGEMENT OF BENEFICIAL INSECTS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Define bee space. | | CO1 | U | | 1 |
| 2. | What is propolis? | | CO2 | R | | 1 |
| 3. | Define – Stifling in sericulture. | | CO1 | U | | 1 |
| 4. | Enlist uses of bee wax. | | CO2 | R | | 1 |
| 5. | Write the medicinal properties of bee venom. | | CO2 | A | | 1 |
| 6. | What is floral fidelity? | | CO2 | U | | 1 |
| 7. | Name the biologist who discovered bee dance | | CO1 | R | | 1 |
| 8. | What is bee bread? | | CO2 | U | | 1 |
| 9. | Mother moth examination is done for silkworms to examine which disease. | | CO1 | An | | 1 |
| 10. | Name the highest-yielding mulberry variety with its yield (ton/ha/year). | | CO1 | R | | 1 |
| 11. | Mention the different castes of honeybees. | | CO1 | R | | 1 |
| 12. | Lac insect belongs to which family. | | CO1 | R | | 1 |
| 13. | Define Sericulture. | | CO1 | U | | 1 |
| 14. | List any two mulberry-sucking pests of mulberry. | | CO2 | A | | 1 |
| 15. | Where the Central Sericultural Research and Training Institute is located? | | CO1 | R | | 1 |
| 16. | Name the silkworms which belong to the family Saturniidae. | | CO2 | U | | 1 |
| 17. | What is chawki rearing? | | CO1 | R | | 1 |
| 18. | Give the two non-domesticated, single-comb honey bee species. | | CO1 | An | | 1 |
| 19. | Name the beetle introduced from Mexicointo India in1984for the control of parthenium. | | CO1 | R | | 1 |
| 20. | Name the substance on which the larva when fed develops into a queen. | | CO2 | A | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Define foraging by bees and list out forage-yielding plants for nectar,pollen and both. | | CO1 | | U | 5 |
| 22. | List out the insect pests and give the integrated pest management in mulberry silkworm rearing. | | CO2 | | A | 5 |
| 23. | Explain different pruning methods of mulberry. | | CO2 | | A | 5 |
| 24. | Brief the methods of leaf harvesting in mulberry. | | CO3 | | A | 5 |
| 25. | Give a detailed account on the importance of beneficial insects and the requirements for their enhancement. | | CO1 | | R | 5 |
| 26. | Discuss the structural modifications in honey bee legs. | | CO2 | | R | 5 |
| 27. | Brief the communication in honey bee hive with special reference to bee dance. | | CO1 | | An | 5 |
| 28. | Propose the criteria for apiary site selection. | | CO4 | | E | 5 |
| 29. | Recommend the management practices followed during honey flow and dearth period. | | CO4 | | An | 5 |
| 30. | Interpret the do’s and dont’s in hive inspection. | | CO4 | | An | 5 |
| 31. | Summarize the hive products of honey bees and their uses. | | CO3 | | A | 5 |
| 32. | State the importance of sericulture in India. | | CO1 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | List out silkworm diseases and explain the symptoms and management practices. | CO1 | | U | 7.5 |
|  | b. | Distinguish the five honey bee species found in India. | CO1 | | R | 7.5 |
| 34. | a. | Brief the different types of planting methods in mulberry and summarize their merits and demerits. | CO4 | | An | 7.5 |
|  | b. | List out pests of honey bees and explain the symptoms and management practices. | CO1 | | A | 7.5 |
| 35. | a. | List out the major pests of mulberry with their damage symptoms and management. | CO4 | | A | 7.5 |
|  | b. | Explain the beekeeping appliances and their uses in the apiary. | CO 4 | | U | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the role of beneficial insects like honeybees, silkworms and lac insect, predators, parasitoids, weed killers |
| CO2 | Remember identification of major parasitoids and predators commonly used in biological control |
| CO3 | Summarize various techniques for mass multiplication of natural enemies |
| CO4 | Apply innovative techniques in silkworm rearing and beekeeping to enhance silk and honey production |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 19 | 21 | 7 | 7 | - | - | 54 |
| CO2 | 7 | 3 | 13 | - | - | - | 23 |
| CO3 | - |  | 10 | - | - | - | 10 |
| CO4 | - | 7 | 8 | 18 | 5 | - | 38 |
| CO5 | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - |
| 26 31 38 25 5 - | | | | | | | **125** |

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| **Course Code** | **18AG2034** | **Duration** | **3hrs** |
| **Course Name** | **FARM MANAGEMENT, PRODUCTION AND RESOURCE ECONOMICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | What is meant by Isoquant? | | CO2 | R | 1 |
| 2. | What is meant by Agricultural production function? | | CO1 | R | 1 |
| 3. | What are all the major factors which are responsible for the production process? | | CO1 | R | 1 |
| 4. | What type of externality is produced when beehives are set up by an entrepreneur in his farm? | | CO6 | R | 1 |
| 5. | Which type of costs doesn’t vary with the level of production? | | CO4 | R | 1 |
| 6. | Which stage of production function does total physical product (TPP) will decline? | | CO2 | R | 1 |
| 7. | What is opportunity cost? | | CO4 | R | 1 |
| 8. | Choose the subject that deals with optimizing the use of farm resources on an individual farm level.   1. Farm Management b. Natural Resource Economics c. Environmental science d. Macro Economics | | CO1 | A | 1 |
| 9. | What is depreciation? | | CO4 | R | 1 |
| 10. | What is the term used to indicate the change in total output when one additional unit of input is added to production? | | CO2 | R | 1 |
| 11. | Show True or False. Factor product relationship is analyzed by applying various levels of an input to a crop and examining its effect on the output. | | CO | U | 1 |
| 12 | Define productivity. | | CO3 | R | 1 |
| 13 | How will you calculate the total cost (TC) with the given variable cost (VC) and fixed cost (FC)? | | CO4 | R | 1 |
| 14 | Name an example for fixed asset. | | CO4 | R | 1 |
| 15 | Choose the rational zone in a production  function  Stage I b. Stage II c. Stage III. | | CO2 | A | 1 |
| 16 | Give one example for variable cost and fixed cost. | | CO4 | R | 1 |
| 17 | Name the financial statement that is used to indicate the net worth of the farm. | | CO6 | R | 1 |
| 18 | Which type of resources can’t be get back and if it is lost it is lost forever? | | CO6 | R | 1 |
| 19 | Show True or False. Isoquants are convex to the origin. | | CO2 | U | 1 |
| 20 | What is called as Resource? | | CO6 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | What is externality, describe the types of externality? | | CO3 | R | 5 |
| 22. | Define factor-factor, factor – product and product-product relationship. | | CO1 | R | 5 |
| 23. | Explain least cost combination. | | CO2 | U | 5 |
| 24. | What is the concept of risk and uncertainty in agricultural production? | | CO3 | R | 5 |
| 25. | Compare gross income and net income. | | CO4 | E | 5 |
| 26. | Explain in detail about cost of cultivation. | | CO4 | U | 5 |
| 27. | Organize the unique properties of natural resources. | | CO5 | An | 5 |
| 28. | Explain the various types of farm records maintained on a farm. | | CO3 | U | 5 |
| 29. | Discuss partial budgeting with its components. | | CO6 | C | 5 |
| 30. | Analyze technical and economic efficiency. | | CO6 | An | 5 |
| 31. | Explain joint products and complementary products with examples. | | CO2 | U | 5 |
| 32. | Elaborate the various ways to minimize the risk in agricultural production. | | CO3 | C | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Summarize the three stages of production function with graph. | CO1 | U | 7.5 |
|  | b. | Explain the types of costs and its relationship with one another. | CO4 | U | 7.5 |
| 34. | a. | Discuss the various ways to manage the common property resources. | CO3 | C | 7.5 |
|  | b. | Explain about farm management, how it is related with other sciences. | CO1 | E | 7.5 |
| 35. | a. | Explain the law of returns. | CO1 | E | 7.5 |
|  | b. | Classify the various types of farm and explain its characteristics. | CO2 | An | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Discuss the concepts and principles of farm management and production economics. |
| CO2 | Demonstrate the optimum use of capital, labor and land by recalling when, where and how to produce principles. |
| CO3 | Discuss the management of resources during crop production, livestock and allied enterprises. |
| CO4 | Apply economic principles towards farm management. |
| CO5 | Plan optimal enterprise combinations to meet household goals. |
| CO6 | Analyze farm business, collect and analyze data on various resources. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 7 | 7.5 | 1 |  | 15 |  | 30.5 |
| CO2 | 3 | 12 | 1 | 7.5 |  |  | 23.5 |
| CO3 | 11 | 5 |  |  |  | 12.5 | 28.5 |
| CO4 | 6 | 12.5 |  |  | 5 |  | 23.5 |
| CO5 |  |  |  | 5 |  |  | 5 |
| CO6 | 4 |  |  | 5 |  | 5 | 14 |
|  | | | | | | | **125** |

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| **Course Code** | **18AG2035** | **Duration** | **3hrs** |
| **Course Name** | **PRINCIPLES OF FOOD SCIENCE AND NUTRITION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | | | | | | | **Course Outcome** | | **Bloom’s Level** | | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | | | | | | | | | |
| 1. | Which is the dispersed phase in egg? | | | | | | | | | CO2 | | R | | | 1 |
| 2. | Name the form of water present in apple. | | | | | | | | | CO3 | | U | | | 1 |
| 3. | Food is a \_\_\_\_\_\_\_\_\_\_ commodity. | | | | | | | | | CO1 | | R | | | 1 |
| 4. | Approximately how much protein does an average adult male require each day? | | | | | | | | | CO2 | | R | | | 1 |
| 5. | Reverse osmosis process is used in the production of \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO1 | | U | | | 1 |
| 6. | A food emulsifier molecule usually contains \_\_\_\_\_\_\_\_\_\_ in its molecular structure. | | | | | | | | | CO2 | | U | | | 1 |
| 7. | \_\_\_\_\_\_\_\_\_\_ is when water goes from a solid to a gas without passing through the liquid phase. | | | | | | | | | CO4 | | R | | | 1 |
| 8. | The point at which a blue haze is given off from the surface of fat or oil during heating is \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO3 | | U | | | 1 |
| 9. | Bacteria in fat/oil could cause \_\_\_\_\_\_\_\_. | | | | | | | | | CO2 | | R | | | 1 |
| 10. | Proteins are metabolized to form \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO2 | | R | | | 1 |
| 11. | Lactose in milk is a \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO2 | | R | | | 1 |
| 12. | When it is consumed, soluble dietary fiber is hydrolyzed by enzymes in to \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO3 | | U | | | 1 |
| 13. | \_\_\_\_\_\_\_\_\_\_ is when water goes from a solid to a gas without passing through the liquid phase. | | | | | | | | | CO3 | | A | | | 1 |
| 14. | Corn syrup is a mixture of Dextrose and \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO4 | | R | | | 1 |
| 15. | Name one secondary metabolite. | | | | | | | | | CO2 | | U | | | 1 |
| 16. | Purple color is naturally got from \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO3 | | U | | | 1 |
| 17. | A two-phase system in which a liquid is dispersed in a solid is \_\_\_\_\_\_\_\_\_\_. | | | | | | | | | CO2 | | R | | | 1 |
| 18. | \_\_\_\_\_\_\_\_\_\_ is a method of cooking in which most of the heat is transferred by conduction. | | | | | | | | | CO2 | | U | | | 1 |
| 19. | Foods high in \_\_\_\_\_\_\_\_\_\_ dry more slowly. | | | | | | | | | CO3 | | R | | | 1 |
| 20. | \_\_\_\_\_\_\_\_\_\_ is the most common polysaccharide added to food products. | | | | | | | | | CO3 | | R | | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | | | | | | | | | |
| 21. | Functional property of Surface tension in food- Analyze. | | | | | | | | | CO1 | | | A | | 5 |
| 22. | Comment on the types of colloids. | | | | | | | | | CO2 | | | R | | 5 |
| 23. | Correlate foods based on the origin and the source of food. | | | | | | | | | CO2 | | | U | | 5 |
| 24. | Classify the bioactive compounds present in food. | | | | | | | | | CO1 | | | U | | 5 |
| 25. | Elaborate the types of fats in food. | | | | | | | | | CO3 | | | R | | 5 |
| 26. | Explain the process of Streker degradation. | | | | | | | | | CO3 | | | U | | 5 |
| 27. | Comment on the different types of food Flavors. | | | | | | | | | CO3 | | | U | | 5 |
| 28. | Tabulate the Mineral deficiency diseases. | | | | | | | | | CO5 | | | U | | 5 |
| 29. | Write a brief note on menu planning for a cancer patient. | | | | | | | | | CO6 | | | A | | 5 |
| 30. | Explain any two carbohydrate deficiency disorders. | | | | | | | | | CO5 | | | R | | 5 |
| 31. | Define and Illustrate the factors for malnutrition. | | | | | | | | | CO5 | | | R | | 5 |
| 32. | Write a short note on fat Metabolism. | | | | | | | | | CO3 | | | U | | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | | | | | | | | | |
| 33. | | a. | | | What are all the chemical reactions of protein in food? Explain in detail. | | | | | CO2 | | | U | | 7 |
|  | | b. | | | Give a brief sketch about the types of carbohydrates in food. | | | | | CO2 | | | U | | 8 |
| 34. | | a. | | | Explain the different types of therapeutic diets. | | | | | CO3 | | | U | | 8 |
|  | | b. | | | Outline the different types of natural and artificial flavors. | | | | | CO4 | | | R | | 7 |
| 35. | | a. | | | Comment on the spoilage caused by bacteria in packed foods. | | | | | CO6 | | | A | | 7 |
|  | | b. | | | Explain the methods of food preservation using low temperature. | | | | | CO2 | | | An | | 8 |
|  | | | | | | | | | | | | | | | |
|  | | | **COURSE OUTCOMES** | | | | | | | | | | | | |
| CO1 | | | Explain the concepts of food science. | | | | | | | | | | | | |
| CO2 | | | Enumerate and describe food composition and food chemistry. | | | | | | | | | | | | |
| CO3 | | | Demonstrate the principles and methods of food processing. | | | | | | | | | | | | |
| CO4 | | | Analyze the methods to control microbes and preserve food. | | | | | | | | | | | | |
| CO5 | | | Identify the nutritional disorders. | | | | | | | | | | | | |
| CO6 | | | Design balanced/modified diet to meet consumer needs. | | | | | | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | | | | | | | | |
| CO / P | | | | **Remember** | | **Understand** | **Apply** | **Analyze** | **Evaluate** | | **Create** | | | **Total** | |
| CO1 | | | | 1 | | 6 | 5 | - | - | | - | | | 12 | |
| CO2 | | | | 11 | | 23 | - | 8 | - | | - | | | 42 | |
| CO3 | | | | 7 | | 27 | 1 | - | - | | - | | | 35 | |
| CO4 | | | | 9 | | - | - | - | - | | - | | | 9 | |
| CO5 | | | | 10 | | 5 | - | - | - | | - | | | 15 | |
| CO6 | | | | - | | - | - | 12 | - | | - | | | 12 | |
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| **Course Code** | **18AT2008** | **Duration** | **3hrs** |
| **Course Name** | **POST-HARVEST ENGINEERING OF HORTICULTURAL CROPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Name two important factors that affect shelf life of fruits and vegetables. | | CO1 | U | | 1 |
| 2. | Give examples of climacteric fruits. | | CO1 | R | | 1 |
| 3. | Flame peeling is used for \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 4. | Give an example of chilling sensitive vegetable. | | CO3 | R | | 1 |
| 5. | What is sweating in dehydration? | | CO4 | U | | 1 |
| 6. | What is the name for ‘Matchstick cuts’. | | CO2 | R | | 1 |
| 7. | What is cellar storage? | | CO5 | U | | 1 |
| 8. | What is precooling? | | CO1 | A | | 1 |
| 9. | What does BTU stands for? | | CO3 | R | | 1 |
| 10. | What is enzymatic browning? | | CO6 | U | | 1 |
| 11. | How is brine prepared? | | CO6 | A | | 1 |
| 12. | What is the purpose of an insulator in the refrigerator? | | CO3 | A | | 1 |
| 13. | What is the freezing temperature required for storage of frozen foods? | | CO3 | R | | 1 |
| 14. | Which part is located at the end of the refrigerator line? | | CO3 | R | | 1 |
| 15. | What is extrusion cooking? | | CO6 | U | | 1 |
| 16. | What does HTST stand for? | | CO6 | R | | 1 |
| 17. | How is fruit color measured? | | CO1 | R | | 1 |
| 18. | Name the fruit softening enzyme? | | CO1 | R | | 1 |
| 19. | What does FSSAI stand for? | | CO6 | R | | 1 |
| 20. | Which is the most concentrated form of processed food? | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Write about the blanching process and its significance. | | CO2 | | A | 5 |
| 22. | Explain the ripening process in fruits and vegetables. | | CO1 | | An | 5 |
| 23. | Write a note on the methods of preserving tomato. | | CO6 | | A | 5 |
| 24. | What is thermal conductivity? How is it useful in the refrigeration process? | | CO3 | | An | 5 |
| 25. | Heat gain of a room is dependent on several factors. Explain how it affects storage? | | CO3 | | E | 5 |
| 26. | Explain the batch drying process with an example. | | CO4 | | A | 5 |
| 27. | Write a note on recent packaging methods. | | CO5 | | A | 5 |
| 28. | Write about modified atmospheric storage. | | CO5 | | An | 5 |
| 29. | Write about the important considerations for long distance transportation of refrigerated horticultural produce. | | CO5 | | E | 5 |
| 30. | What are the chemicals used in hastening or delaying ripening? | | CO6 | | R | 5 |
| 31. | What is the need to establish cross docking terminals? | | CO5 | | An | 5 |
| 32. | What is minimal processing and explain the need for minimal processing? | | CO6 | | A | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain about the latest technologies in processing of Horticultural produce. | CO6 | | An | 8 |
|  | b. | Explain the various factors affecting the ripening process. | CO1 | | E | 7 |
| 34. | a. | What is dehydration? Name the factors affecting the drying process? Explain the various drying processes. | CO4 | | An | 8 |
|  | b. | What is canning? Explain the canning process of low acid foods. | CO6 | | U | 7 |
| 35. | a. | List the various value-added products of tomato and describe the manufacturing process. | CO6 | | A | 8 |
|  | b. | Explain the four major parts of a refrigerator and its functioning. | CO3 | | R | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Explain the importance of fruits, vegetables, spices, condiments and flower processing | | | | | | | |
| CO2 | Describe the process and methods of peeling, slicing and blanching. | | | | | | | |
| CO3 | Describe the process of chilling, freezing and cold storage. | | | | | | | |
| CO4 | Describe methods of drying and dehydration. | | | | | | | |
| CO5 | Comprehend packaging requirements, packaging methods/machines, handling and transportation. | | | | | | | |
| CO6 | Evaluate the preservation techniques/ methods and quality control for perishable products. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 3 | 1 | 1 | 5 | 7 |  | 17 |
| CO2 | | 2 |  | 5 |  |  |  | 7 |
| CO3 | | 11 |  | 1 | 5 | 5 |  | 22 |
| CO4 | |  | 2 | 10 | 5 | 8 |  | 25 |
| CO5 | |  | 1 |  | 5 | 5 |  | 11 |
| CO6 | | 7 | 9 | 19 | 8 |  |  | 43 |
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| **Course Code** | **18AT2015** | **Duration** | **3hrs** |
| **Course Name** | **GROUNDWATER, WELLS AND PUMPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | | **Course Outcome** | | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | | | |
| 1. | List down different subsurface zones in relation to groundwater occurrence. | | | CO1 | | R | | 1 | |
| 2. | What is groundwater reservoir? | | | CO1 | | R | | 1 | |
| 3. | The water bearing geologic formation or strata which yields significant amount of water for economic extraction from wells are called \_\_\_\_\_\_\_\_\_\_. | | | CO1 | | U | | 1 | |
| 4. | \_\_\_\_\_\_\_\_\_\_ is provided at the entrance of suction pipe during centrifugal pump installation. | | | CO2 | | R | | 1 | |
| 5. | In a [centrifugal pump](https://www.mechanicaltutorial.com/different-types-and-application-of-centrifugal-pump) the liquid enters the pump \_\_\_\_\_\_\_\_\_.  a. at the top b. at the bottom c. at the centre d. from sides. | | | CO2 | | U | | 1 | |
| 6. | Which of the following pumps are classified under positive displacement pump?  a. hand pump b. rotary piston pump c. vane pump.  d. gear pump. | | | CO2 | | U | | 1 | |
| 7. | Which type of pump is specifically used for shallow wells?  a. Hand pump b. Reciprocating pump c. Jet pump. d) Centrifugal pump. | | | CO2 | | U | | 1 | |
| 8. | Which valve in centrifugal pump helps in priming?  a. suction valve b. delivery valve c.check valve.  d. foot valve. | | | CO2 | | U | | 1 | |
| 9. | Soil permeability is affected by the presence of high \_\_\_\_\_\_\_\_\_\_\_\_ content in the irrigated water | | | CO1 | | U | | 1 | |
| 10. | Which ion in the groundwater sample renders the soil alkaline, at equilibrium condition? | | | CO1 | | U | | 1 | |
| 11. | The correlation between EC and \_\_\_\_\_\_\_\_\_\_\_\_\_ is represented in Wilcox diagram for classification of groundwater for irrigation. | | | CO1 | | Ap | | 1 | |
| 12. | Define water table. | | | CO2 | | R | | 1 | |
| 13. | The geologic formation which only store water but cannot transmit significant amounts are called \_\_\_\_\_\_\_\_\_\_\_. | | | CO2 | | U | | 1 | |
| 14. | What is infiltration? | | | CO1 | | U | | 1 | |
| 15. | Define porosity. | | | CO1 | | R | | 1 | |
| 16. | Which type of soil has maximum porosity and low permeability? | | | CO1 | | U | | 1 | |
| 17. | What is the purpose of screens in wells? | | | CO3 | | U | | 1 | |
| 18. | In an unconfined aquifer the top zone of saturation is the  a. Capillary fringe b. Vadose water table c. Static water table.  d. Zone of aeration. | | | CO1 | | R | | 1 | |
| 19. | List down two parameters that influence the increase in groundwater storage. | | | CO2 | | U | | 1 | |
| 20. | Define specific yield. | | | CO2 | | R | | 1 | |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | | | |
| 21. | Differentiate fully penetrating and partially penetrating wells. | | | | CO3 | | U | | 5 |
| 22. | Discuss in detail about the design parameters of bore wells. | | | | CO2 | | U | | 5 |
| 23. | Explain in detail on any one of the methods of ground exploration techniques with sketch. | | | | CO3 | | U | | 5 |
| 24. | How the aquifer parameters are determined using Theis’s method? | | | | CO1 | | An | | 5 |
| 25. | How is the water quality index of a sample determined? | | | | CO1 | | An | | 5 |
| 26. | Classify different types of wells. | | | | CO2 | | U | | 5 |
| 27. | Discuss in detail on any two artificial recharge structures. | | | | CO1 | | U | | 5 |
| 28. | How the irrigation water quality is assessed using sodium absorption ratio and Residual Sodium carbonate. | | | | CO1 | | An | | 5 |
| 29. | Define Darcy’s law and list down the limitations of Darcy’s law. | | | | CO1 | | U | | 5 |
| 30. | Explain the working principle of submergible and propeller pumps in detail with sketch. | | | | CO2 | | Ap | | 5 |
| 31. | Discuss the following with sketch  a. Drawdown b. Radius of influence. | | | | CO1 | | An | | 5 |
| 32. | How are the performance curves of pumps evaluated? | | | | CO3 | | E | | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | | | |
| 33. | | a. | Discuss in detail the different types of aquifers. | | CO1 | | U | | 12 |
|  | | b. | Differentiate porosity and permeability. | | CO1 | | U | | 3 |
| 34. | | a. | Classify different types of pumps (represent in flowchart form). | | CO2 | | An | | 8 |
|  | | b. | List down the advantages and disadvantages of open wells. | | CO3 | | U | | 7 |
| 35. | | a. | Explain in detail the different components of centrifugal pumps. | | CO2 | | Ap | | 10 |
|  | | b. | How the total head, elevation head and pressure head in the well are determined with respect to subsurface datum. | | CO1 | | An | | 5 |

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|  | **COURSE OUTCOMES** |
| CO1 | The students will know the technical aspects of groundwater, its availability, assessment and utilization. |
| CO2 | The students will be familiarized with the theory behind well design. |
| CO3 | The students will have the ability to construct and management of wells. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 4 | 30 | 1 | 25 |  |  | 60 |
| CO2 | 3 | 16 | 15 | 8 |  |  | 42 |
| CO3 |  | 18 |  |  | 5 |  | 23 |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| --- | --- | --- | --- |
| **Course Code** | **18AT2016** | **Duration** | **3hrs** |
| **Course Name** | **WATER HARVESTING AND SOIL CONSERVATION STRUCTURES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | What is the purpose of Farm Pond? | | CO1 | R | 1 |
| 2. | Write down an example of groundwater harvesting in the mountain area. | | CO1 | R | 1 |
| 3. | What is the main function of percolation pond? | | CO1 | U | 1 |
| 4. | Which type of pond is constructed in the area of natural creeks? | | CO1 | U | 1 |
| 5. | Which ponds are constructed with the excavated soil from the ground? | | CO1 | R | 1 |
| 6. | Write down any two temporary water and soil conservation structures. | | CO2 | R | 1 |
| 7. | Which type of pond is constructed across the second to third order stream? | | CO1 | U | 1 |
| 8. | Which component in drop spillway prevents scouring? | | CO3 | R | 1 |
| 9. | Write the equation to calculate Froude number. | | CO3 | U | 1 |
| 10. | What is the rational formula used for calculating the peak flow rate? | | CO2 | U | 1 |
| 11. | What is the function of wingwall? | | CO3 | R | 1 |
| 12. | What is the purpose of providing gutters and pipes in the roof top water harvesting systems? | | CO1 | U | 1 |
| 13. | What is the life span of check dams? | | CO2 | U | 1 |
| 14. | What is the function of drop inlet spill way? | | CO3 | U | 1 |
| 15. | How the area of the contours in the map is measured? | | CO2 | R | 1 |
| 16. | What should be the average annual rainfall in the area that is suitable for construction of contour bunds? | | CO2 | R | 1 |
| 17. | Which of the following formula is used to store the volume of water in the farm ponds? | | CO2 | R | 1 |
| 18. | \_\_\_\_\_\_\_\_\_ are designed to provide safe discharge of water and to prevent soil erosion.  a. Gully control structures b. embankment type of ponds c. dugout ponds d. Percolation ponds | | CO3 | U | 1 |
| 19. | In which basin, the chute blocks, baffle blocks, and an end sill are provided? | | CO3 | U | 1 |
| 20. | Which type of spill way is suitable for gully drops of 3–4 m? | | CO3 | U | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | Explain in detail the different components of rooftop water harvesting structure. | | CO1 | U | 5 |
| 22. | Analyze the design components of farm ponds and explain how the volume of the farm pond is calculated. | | CO2 | An | 5 |
| 23. | Explain any two types of temporary gully control structures (Check Dam). | | CO2 | U | 5 |
| 24. | List down five functions of gully control structures. | | CO3 | U | 5 |
| 25. | Analyze different types of failures in structural design during the construction of drop spill way. | | CO3 | An | 5 |
| 26. | What is the function of Saint Antony Falls (SAF) in chute spill way and outline the functions of chute and floor blocks. | | CO3 | U | 5 |
| 27. | Analyze the different forces acting on the drop spill way. | | CO3 | An | 5 |
| 28. | Outline the design considerations of Nalla bunds. | | CO2 | An | 5 |
| 29. | Differentiate long term and short-term rainwater harvesting structures. | | CO1 | Ap | 5 |
| 30. | Write short notes on the following water harvesting structures  a. Bunds b. Terraces. | | CO2 | U | 5 |
| 31. | Briefly explain any two methods of runoff water harvesting structures | | CO1 | U | 5 |
| 32. | Compare the inlet, conduit and outlet components of three permanent gully control structures. | | CO3 | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Explain in detail the functions of different components of Drop Spillway with a neat sketch. | CO3 | Ap | 12 |
|  | b. | Write the function of hydraulic jump with a sketch. | CO3 | Ap | 3 |
|  |  |  |  |  |  |
| 34. | a. | Analyze the design steps in the construction of percolation ponds. | CO2 | An | 10 |
|  | b. | Discuss in detail on rock and ground catchments in water harvesting. | CO1 | U | 5 |
|  |  |  |  |  |  |
| 35. | a. | Explain in detail the different types of farm ponds with neat sketch. | CO1 | Ap | 8 |
|  | b. | Calculate the capacity of the pond given the area enclosed by different contours using trapezoidal and prismoidal formula.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Elevation (m) | 200 | 220 | 240 | 260 | 280 | 360 | | Area of contours (km2) | 150 | 175 | 210 | 270 | 320 | 400 | | CO1 | An | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | The students will be able to gain fundamental knowledge on the concepts of water harvesting. |
| CO2 | The students will have sufficient knowledge on soil and water conservation measures. |
| CO3 | The students will be able to design various soil and water conservation structures. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 19 | 13 | 7 |  |  | 42 |
| CO2 | 4 | 12 |  | 20 |  |  | 36 |
| CO3 | 2 | 20 | 15 | 10 |  |  | 47 |
|  | | | | | | | **125** |

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| **Course Code** | **18AT2020** | **Duration** | **3hrs** |
| **Course Name** | **PROCESS ENGINEERING FOR SPICES AND PLANTATION CROPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Which state in India is the major producer of nutmeg? | | | CO1 | R | | 1 |
| 2. | The process of pressing the rubber to form a composite sheet is known as \_\_\_\_\_\_\_\_\_\_\_. | | | CO3 | U | | 1 |
| 3. | \_\_\_\_\_\_\_\_\_\_\_ tea is the mixture of green and black tea. | | | CO5 | U | | 1 |
| 4. | Which country is known as ‘Home of Spices’? | | | CO1 | R | | 1 |
| 5. | \_\_\_\_\_\_\_\_\_\_\_ pigment is responsible for red colour in chilli. | | | CO5 | R | | 1 |
| 6. | Which is called as queen of spices? | | | CO1 | R | | 1 |
| 7. | Natural rubber tapped from the rubber tree is known as \_\_\_\_\_\_\_\_\_\_\_. | | | CO3 | U | | 1 |
| 8. | The processing step after the heat killing treatment in vanilla is \_\_\_\_\_\_\_\_\_\_\_. | | | CO3 | U | | 1 |
| 9. | Removal of caffeine from coffee beans is called \_\_\_\_\_\_\_\_\_\_\_. | | | CO3 | U | | 1 |
| 10. | During roasting process of coffee the temperature of the bean goes up to \_\_\_\_\_\_\_\_\_\_\_oC | | | CO3 | R | | 1 |
| 11. | Coagulation of latex is done by adding \_\_\_\_\_\_\_\_\_\_\_ acid. | | | CO1 | R | | 1 |
| 12. | Name the world’s largest producer of vanilla. | | | CO1 | R | | 1 |
| 13. | List the byproducts obtained from nutmeg. | | | CO2 | U | | 1 |
| 14. | Name the polyphenol present in tea. | | | CO5 | U | | 1 |
| 15. | The volatile oil obtained from the clove bud contains mainly \_\_\_\_\_\_\_\_\_\_\_ (80-90%). | | | CO3 | R | | 1 |
| 16. | Name the twin spice. | | | CO2 | R | | 1 |
| 17. | What is ASTA? | | | CO5 | U | | 1 |
| 18. | What is Vulcanization in rubber processing? | | | CO1 | U | | 1 |
| 19. | List some of the uses of cashew nut shell liquid. | | | CO2 | R | | 1 |
| 20. | What is the need of curing treatment in cardamom processing? | | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Elaborate the processing of nutmeg. | | | CO3 | | E | 5 |
| 22. | Discuss the unit operations involved in the chilli processing. | | | CO1 | | C | 5 |
| 23. | Explain in detail the packaging material requirements for spices. | | | CO6 | | An | 5 |
| 24. | Write the importance of AGMARK & ESA. | | | CO5 | | E | 5 |
| 25. | Explain the processing of any two value added coconut products. | | | CO2 | | A | 5 |
| 26. | Interpret the health benefits of some major spices. | | | CO4 | | E | 5 |
| 27. | Elaborate the processing of turmeric. | | | CO1 | | E | 5 |
| 28. | Elaborate the processing, grading and value added product from clove. | | | CO2 | | A | 5 |
| 29. | Build the flowchart for processing of oil-palm. | | | CO3 | | C | 5 |
| 30. | Discuss the quality regulations of spices to meet the international standards. | | | CO5 | | A | 5 |
| 31. | Discuss the processing of natural rubber. | | | CO3 | | E | 5 |
| 32. | Explain the unit operations involved in the processing of ginger. | | | CO1 | | E | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Elaborate the processing of tea. | CO1 | | An | 7.5 |
|  | | b. | Explain the different packaging methods of spices. | CO6 | | E | 7.5 |
| 34. | | a. | Explain in detail the processing of vanilla. | CO5 | | E | 7.5 |
|  | | b. | Explain some the extraction techniques of medicinal plants. | CO5 | | An | 7.5 |
| 35. | | a. | Elaborate the unit operation of pepper. | CO3 | | C | 7.5 |
|  | | b. | Elaborate the modern method of cashew processing. | CO3 | | C | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge in different unit operations and its equipment involved in processing of major and minor spices. |
| CO2 | Develop value added products from plantation crops and spices. |
| CO3 | Demonstrate different techniques for spices and plantaion crops with minimum post harvest losses. |
| CO4 | Acquire knowledge on importance of medicinal crops. |
| CO5 | Describe extraction methods with quality standards. |
| CO6 | Apply the knowledge on packaging and storage of spices. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | 1 |  | 7.5 | 10 | 5 | 28.5 |
| CO2 | 2 | 1 | 10 |  | 10 |  | 23 |
| CO3 | 2 | 4 |  |  |  | 20 | 26 |
| CO4 |  | 1 |  |  | 5 |  | 6 |
| CO5 | 1 | 3 | 5 | 7.5 | 12.5 |  | 29 |
| CO6 |  |  |  | 5 | 7.5 |  | 12.5 |
|  | | | | | | | **125** |

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| **Course Code** | **18AT2034** | **Duration** | **3hrs** |
| **Course Name** | **FARM MACHINERY AND POWER** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | List any four parts of an IC engine | | | CO1 | U | | 1 |
| 2. | What is the standard disc angle for a good plough  What is the purpose the Camshaft? | | | CO1 | R | | 1 |
| 3. | Which was the first tractor company established in India | | | CO1 | R | | 1 |
| 4. | Which is a mechanical device, designed to control the speed of an engine within the specified limit. | | | CO2 | R | | 1 |
| 5. | List the sources of farm power. | | | CO2 | U | | 1 |
| 6. | List types of sprayer | | | CO2 | R | | 1 |
| 7. | What should be the disc angle for good plough? | | | CO1 | U | | 1 |
| 8. | Define tillage. | | | CO2 | R | | 1 |
| 9. | List the sources of farm power. | | | CO2 | U | | 1 |
| 10. | Which was the first tractor company established in India? | | | CO2 | U | | 1 |
| 11. | Name the pin used to join the connecting rod to the piston. | | | CO4 | U | | 1 |
| 12. | Identify component used to connect and disconnect the tractor engine from the transmission gears. | | | CO4 | R | | 1 |
| 13. | Define Tilt angle. | | | CO5 | R | | 1 |
| 14. | What is the formula to find Indicated Horse Power for four stroke engine? | | | CO5 | R | | 1 |
| 15. | Name the two types of piston rings. | | | CO1 | U | | 1 |
| 16. | Which type of tractor, otherwise called as walking type tractor? | | | CO6 | R | | 1 |
| 17. | What is the depth of ploughing of chisel plough? | | | CO6 | U | | 1 |
| 18. | Name the part of IC engine which stores energy during power stroke and returns back the same energy during the idle strokes | | | CO1 | R | | 1 |
| 19. | When is the mower knife said to be in proper registration | | | CO2 | U | | 1 |
| 20. | Which machine is used to apply chemicals in dust form | | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Discuss the formulae for finding all the Variable Cost of farm machinery. | | | CO3 | | An | 5 |
| 22. | Discuss the working of air cooling system. | | | CO2 | | U | 5 |
| 23. | Explain the working of Carburetor. | | | CO5 | | An | 5 |
| 24. | Elaborate the Power transmission system of a tractor. | | | CO4 | | U | 5 |
|  | Discuss about star type weeder and cono weeder with a neat sketch | | |  | |  |  |
| 25. | Elaborate the different types of threshing cylinders | | | CO5 | | An | 5 |
| 26. | Explain the working of knapsack sprayer | | | CO6 | | U | 5 |
| 27. | Explain about olpad thresher | | | CO4 | | An | 5 |
| 28. | Importance of different components of IC engine. | | | CO2 | | U | 5 |
| 29. | Discuss the different types of Lubrication system. | | | CO5 | | An | 5 |
| 30. | Discuss the working of Chisel plough with a neat sketch. | | | CO4 | | U | 5 |
| 31. | Compare the working of Two stroke and Four stroke IC engines | | | CO5 | | An | 5 |
| 32. | Discuss the formulae for finding all the Variable Cost of farm machinery. | | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Classify the cooling system and explain briefly the water cooling system | CO4 | | U | 8 |
|  | | b. | Discuss in detail about the mould board plough. | CO3 | | R | 7 |
|  | |  |  |  | |  |  |
| 34. | | a. | Explain in detail about the power sprayer | CO5 | | U | 8 |
|  | | b. | Mark the components of combine harvester with a neat sketch and explain | CO5 | | R | 7 |
|  | |  |  |  | |  |  |
| 35. | | a. | Classify the tractors based on purpose of use and explain briefly | CO6 | | U | 8 |
|  | | b. | Discuss the working principle of 4 stroke IC engine with a neat sketch. | CO6 | | An | 7 |
|  | |  |  |  | |  |  |

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|  | **COURSE OUTCOMES** |
| CO1 | Evaluate the components of IC engine |
| CO2 | Demonstrate the working principles and maintenance of tractor |
| CO3 | Demonstrate the working principle of tillage equipment and inter cultivation equipment |
| CO4 | Examine working of various sowing and planting equipment |
| CO5 | Demonstrate the working principles of plant protection equipment |
| CO6 | Demonstrate the working principles of harvesting and threshing equipment |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 9 | 7 | 5 | 5 | 8 | 7 | 41 |
| CO2 | 4 | 3 | 2 | 1 | - | - | 10 |
| CO3 | 5 | - | - | 5 | 4 | 3 | 17 |
| CO4 | 7 | - | 4 | 3 | 4.5 |  | 18.5 |
| CO5 | 4 | 3 | 4 | 5 | 7 | - | 23 |
| CO6 | - | - | - | - | 7 | 8.5 | 15.5 |
|  | | | | | | | **125** |

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| **Course Code** | **18AT2042** | **Duration** | **3hrs** |
| **Course Name** | **RENEWABLE ENERGY AND GREEN TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | Name the plant commercially used for Biodiesel production. | | CO5 | R | 1 |
| 2. | State the ratio of digester to gas holder in fixed dome type biogas plant. | | CO4 | R | 1 |
| 3. | Name the gasifier in which air flow in the upward direction. | | CO5 | R | 1 |
| 4. | State the process of bioethanol production. | | CO6 | U | 1 |
| 5. | Mention the stage of gasification of maximum temperature. | | CO5 | U | 1 |
| 6. | Name the gaseous fuel produced by pyrolysis. | | CO5 | R | 1 |
| 7. | Mention the biogas plant model suitable for hilly places. | | CO4 | U | 1 |
| 8. | Name the process of Biogas production. | | CO6 | R | 1 |
| 9. | Write the by-product obtained in Biodiesel production process. | | CO3 | U | 1 |
| 10. | Name the microbe involved in biogas production. | | CO4 | R | 1 |
| 11. | State which non-metal is used in the manufacture of SPVC. | | CO1 | U | 1 |
| 12. | Name one indirect solar drier. | | CO2 | R | 1 |
| 13. | Mention the drier suitable for large scale drying. | | CO1 | R | 1 |
| 14. | Name the type of solar cooker with high heating efficiency. | | CO2 | R | 1 |
| 15. | Name the salt which is added to the solar pond. | | CO3 | R | 1 |
| 16. | Write one negative impact of hydroelectric power project. | | CO3 | R | 1 |
| 17. | List the parts of the horizontal axis wind mill. | | CO5 | U | 1 |
| 18. | Name the elements used in N type SPVC cell. | | CO1 | R | 1 |
| 19. | Name the process of mixing 2 elements in the SPVC production process. | | CO1 | U | 1 |
| 20. | Mention the working principle of solar pond. | | CO3 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | List the points to be considered during site selection for biogas plant establishment. | | CO4 | U | 5 |
| 22. | Illustrate the working principles of up-draft and down-draft gasifiers. | | CO6 | U | 5 |
| 23. | Explain with equation the biodiesel production. | | CO6 | U | 5 |
| 24. | Compare and contrast the pros and cons of solar and wind energy. | | CO6 | An | 5 |
| 25. | Elaborate the structure of Box-type solar cooker. | | CO2 | U | 5 |
| 26. | List the different models of solar driers. | | CO2 | U | 5 |
| 27. | List the similarities and differences of wet and dry milling process of bioethanol production. | | CO6 | U | 5 |
| 28. | Distinguish solar thermal and solar power appliances with examples. | | CO5 | An | 5 |
| 29. | Explain solar distillation with schematic diagram. | | CO1 | U | 5 |
| 30. | Differentiate stand alone and grid connected solar appliances with example | | CO1 | An | 5 |
| 31. | Explain the process of Briquette making. | | CO3 | U | 5 |
| 32. | Write the advantages and disadvantages of Biomass energy. | | CO6 | A | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Illustrate the structure and function of KVIC biogas plant. | CO4 | U | 8 |
|  | b. | Explain the parameters for maximum biogas production. | CO4 | A | 7 |
| 34. | a. | Explain the applications of solar energy in agriculture with examples. | CO2 | U | 8 |
|  | b. | Discuss the structure and working principle of solar photovoltaic cell. | CO1 | U | 7 |
| 35. | a. | Discuss in brief the future of renewable energy in India. | CO3 | An | 8 |
|  | b. | Explain in detail the hydro power plant. | CO5 | U | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Gain basic knowledge of Solar energy harvesting. | | | | | | | |
| CO2 | Familiarize with different types of Solar energy gadgets. | | | | | | | |
| CO3 | Understand the contributions of energy sources to agriculture. | | | | | | | |
| CO4 | Remember different types of biogas production structures. | | | | | | | |
| CO5 | Design renewable energy structures. | | | | | | | |
| CO6 | Analyze the green energy techniques. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 2 | 14 | - | 5 | - | - | 21 |
| CO2 | | 2 | 18 | - | - | - | - | 20 |
| CO3 | | 3 | 8 | - | 8 | - | - | 19 |
| CO4 | | 2 | 14 | 7 | - | - | - | 23 |
| CO5 | | 3 | 7 | - | 5 | - | - | 15 |
| CO6 | | 1 | 16 | 5 | 5 | - | - | 27 |
|  | | | | | | | | **125** |

**Graphical user interface, application

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| **Course Code** | **18AT2043** | **Duration** | **3hrs** |
| **Course Name** | **PROTECTED CULTIVATION AND SECONDARY AGRICULTURE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Apart from protected cultivation of crops, the greenhouses can be effectively used for \_\_\_\_\_\_\_\_\_. | | | | CO2 | U | 1 |
| 2. | Name the cooling system that has louvered air inlet, a polyethylene tube with air distribution holes, a pressurizing fan to direct air in to the tube under pressure, and an exhaust fan to create vacuum. | | | | CO1 | R | 1 |
| 3. | \_\_\_\_\_\_\_\_is defined as the process of moisture removal from the food products to a safe level by using heat. | | | | CO5 | R | 1 |
| 4. | What is a Shade net house? | | | | CO1 | R | 1 |
| 5. | The physical properties, frictional properties, aerodynamic properties, hydrodynamic properties,thermal properties, rheological properties,mechanical properties etc. of grains are termed as \_\_\_\_\_\_\_\_\_\_\_ properties of grains. | | | | CO4 | R | 1 |
| 6. | What is Greenhouse Technology? | | | | CO2 | U | 1 |
| 7. | What is the name of this greenhouse, when it is placed against the side of an existing building and it is built against a building, using the existing structure for one or more of its sides? | | | | CO3 | R | 1 |
| 8. | The response of crop plants to the duration of light for flowering is termed as \_\_\_\_\_\_\_\_\_\_. | | | | CO2 | U | 1 |
| 9. | \_\_\_\_\_\_\_\_\_\_\_\_\_ is referred as the range of solar radiation that plants can use to create energy through photosynthesis. | | | | CO2 | U | 1 |
| 10. | The light intensity is measured by the international unit known as \_\_\_\_\_\_\_. | | | | CO2 | R | 1 |
| 11. | Desired moisture content of agriculture produce (cereals, pulses and millets) at the time of storing is \_\_\_\_\_\_. | | | | CO4 | U | 1 |
| 12. | What is the wavelength range of Photosynthetically Active Radiation? | | | | CO1 | R | 1 |
| 13. | What is the normal level of Carbon Dioxide in the atmosphere? | | | | CO1 | R | 1 |
| 14. | Name this type of greenhouse, when its two roof slopes are of equal pitch and width. | | | | CO3 | R | 1 |
| 15. | What is the formula to find sphericity? | | | | CO4 | R | 1 |
| 16. | Name the different types of belt conveyor. | | | | CO6 | U | 1 |
| 17. | What is meant by angle of repose? | | | | CO4 | U | 1 |
| 18. | Name any two commercially available grain dryers. | | | | CO5 | R | 1 |
| 19. | Name the tree commonly used for the construction of low cost greenhouse. | | | | CO1 | U | 1 |
| 20. | Define bulk density. | | | | CO4 | U | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Explain the working of Screw Conveyor. | | | | CO6 | E | 5 |
| 22. | Elaborate the different types of irrigation system. | | | | CO3 | C | 5 |
| 23. | Illustrate the working active summer cooling system with a neat sketch. | | | | CO2 | An | 5 |
| 24. | Explain shade net its types and uses. | | | | CO2 | E | 5 |
| 25. | Explain the working of fluidized bed dryer. | | | | CO5 | E | 5 |
| 26. | Elaborate the different physical properties of the food grains. | | | | CO4 | C | 5 |
| 27. | Discuss the working of solar dryer with neat sketch. | | | | CO5 | C | 5 |
| 28. | Elaborate the different frictional properties of the food grains. | | | | CO4 | C | 5 |
| 29. | Discuss the low cost greenhouse and the materials used for its construction. | | | | CO1 | A | 5 |
| 30. | Illustrate the working active winter cooling system. | | | | CO2 | A | 5 |
| 31. | Discuss the technological reasons that enhance the crop growth under greenhouse condition. | | | | CO2 | An | 5 |
| 32. | Criticize on the site selection for greenhouse construction | | | | CO3 | E | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Elaborate the types and working of belt Conveyor. | CO6 | | C | 7.5 |
|  | | b. | Classify the greenhouse based on its shape. | CO2 | | An | 7.5 |
| 34. | | a. | Elaborate the working of drip irrigation with a neat sketch. | CO3 | | C | 7.5 |
|  | | b. | List the advantages and disadvantages of using the drip irrigation system. | CO3 | | A | 7.5 |
| 35. | | a. | Explain the direct methods for determination of moisture content. | CO5 | | E | 7.5 |
|  | | b. | Elaborate the working of pneumatic conveyor. | CO6 | | C | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Plan and design low cost green houses. |
| CO2 | Predict the plant responses to greenhouse environment. |
| CO3 | Estimate the cost benefit economics of protected cultivation. |
| CO4 | Understand engineering properties of food materials. |
| CO5 | Explain the working of commercial grain dryers. |
| CO6 | Illustrate the material handling equipments. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 4 | 1 | 5 |  |  |  | 10 |
| CO2 | 1 | 4 | 5 | 17.5 | 5 |  | 32.5 |
| CO3 | 2 |  | 7.5 |  | 5 | 12.5 | 27 |
| CO4 | 2 | 3 |  |  |  | 10 | 15 |
| CO5 | 2 |  |  |  | 12.5 | 5 | 19.5 |
| CO6 |  | 1 |  |  | 5 | 15 | 21 |
|  | | | | | | | **125** |

**Graphical user interface, application

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| **Course Code** | **18AT2049** | **Duration** | **3hrs** |
| **Course Name** | **APPLICATIONS OF SOLAR AND WIND ENERGY IN AGRICULTURE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Which type of radiation is measured by pyranometer? | | CO1 | U | | 1 |
| 2. | Define diffuse radiation. | | CO1 | R | | 1 |
| 3. | List down the instruments used for measuring solar radiation. | | CO1 | R | | 1 |
| 4. | \_\_\_\_\_\_\_\_\_\_ has thermal mass to collect and store solar heat energy, and insulation to retain this heat for use during the night and on cloudy days. | | CO1 | A | | 1 |
| 5. | Which salt is added in the solar pond? | | CO1 | A | | 1 |
| 6. | Which element was used in first recognisable solar panel? | | CO1 | A | | 1 |
| 7. | Area of the topcover with the frame in the solar flat plate collector is \_\_\_\_\_\_\_\_\_\_. | | CO1 | U | | 1 |
| 8. | What is the role of potentiometer? | | CO1 | U | | 1 |
| 9. | **The amount of energy available in the wind at any instant is proportional to** \_\_\_\_\_\_\_\_\_\_ **of the wind speed.** | | CO2 | A | | 1 |
| 10. | During the day, the air above the land heats up more quickly than the air over water. – True / False. | | CO2 | U | | 1 |
| 11. | Air in motion is called \_\_\_\_\_\_\_\_\_\_ (wind). | | CO2 | R | | 1 |
| 12. | List two atmospheric processes that significantly affect the incident irradiation. | | CO2 | R | | 1 |
| 13. | Which device is used for to turn wind energy into mechanical energy? | | CO2 | U | | 1 |
| 14. | How the wind shear is represented? | | CO2 | U | | 1 |
| 15. | What are vertical wind turbines? | | CO2 | U | | 1 |
| 16. | Which type of wind turbines produce 100 kW or greater? | | CO2 | R | | 1 |
| 17. | Define power law. | | CO2 | U | | 1 |
| 18. | Give an example of Horizontal axis wind machine? | | CO2 | R | | 1 |
| 19. | What is the main advantage of a vertical wind turbine? | | CO2 | U | | 1 |
| 20. | Lift forces act perpendicular to the direction of air flow (True / False). | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | List down five salient features of solar pond. | | CO1 | | An | 5 |
| 22. | Outline the working principle of inverters. | | CO1 | | A | 5 |
| 23. | With a neat sketch, explain in detail on the working principle of solar green house. | | CO1 | | U | 5 |
| 24. | Explain with a neat sketch of solar PV based power plant. | | CO1 | | A | 5 |
| 25. | Discuss in detail the working principle of solar pump with a sketch. | | CO1 | | A | 5 |
| 26. | Explain in detail the working principle of horizontal axis wind machines with a neat sketch. | | CO2 | | A | 5 |
| 27. | Differentiate fixed speed and variable speed wind turbine. | | CO2 | | U | 5 |
| 28. | Discuss in detail the different types of wind turbines with neat sketch. | | CO2 | | U | 5 |
| 29. | Derive the equation for the calculation of wind power. | | CO4 | | An | 5 |
| 30. | List down the characteristics of a suitable wind power site. | | CO4 | | U | 5 |
| 31. | With a sketch, explain any one of the methods of measurement of solar radiation. | | CO1 | | U | 5 |
| 32. | Explain in detail the working principle of solar distillation (with a sketch). | | CO1 | | A | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain in detail on the working principle of natural convection dryers and forced convection dryers. | CO1 | | U | 9 |
|  | b. | Analyze the upwind and downwind systems. | CO2 | | U | 6 |
| 34. | a. | Discuss in detail the structure of airfoil with a neat sketch. | CO2 | | An | 8 |
|  | b. | Differentiate concentrating and non-concentrating solar collector system (with sketch and example). | CO1 | | U | 7 |
| 35. | a. | Discuss in detail the energy storage devices related to wind energy. | CO3 | | U | 7 |
|  | b. | Explain in detail the different renewable energy sources. | CO5 | | U | 8 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the applications of Solar energy in agriculture | | | | | | | |
| CO2 | Know about the applications of wind energy in agriculture. | | | | | | | |
| CO3 | Familiar with the idea of photovoltaic technology. | | | | | | | |
| CO4 | Analyse wind mapping. | | | | | | | |
| CO5 | Gain sufficient knowledge on different alternate energy sources. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 2 | 29 | 23 | 5 |  |  | 59 |
| CO2 | | 4 | 22 | 6 | 8 |  |  | 40 |
| CO3 | |  | 7 |  |  |  |  | 7 |
| CO4 | |  | 6 |  | 5 |  |  | 11 |
| CO5 | | 8 |  |  |  |  |  | 8 |
|  | | | | | | | | **125** |

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| **Course Code** | **18HO1001/17AG1010** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF HORTICULTURE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | Define Horticulture. | | CO1 | R | 1 |
| 2. | Write Vitamin-C rich fruit crop \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 3. | Example for aggregate fruit is\_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 4. | Define Floriculture. | | CO1 | R | 1 |
| 5. | Define kitchen garden. | | CO3 | R | 1 |
| 6. | Name two external factors affecting growth and development of plant. | | CO3 | An | 1 |
| 7. | Define Grafting. | | CO2 | R | 1 |
| 8. | Define air layering. | | CO1 | R | 1 |
| 9. | Write any two common diseases of plants at nursery stage. | | CO1 | R | 1 |
| 10. | Define High density planting. | | CO4 | R | 1 |
| 11. | Define ratoon cropping. | | CO4 | R | 1 |
| 12. | Retaining only the main crop by removing all other vegetation refers to \_\_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 13. | When mango is planted at a distance of 10 m × 10 m, \_\_\_\_\_\_\_ number of plants can be accommodated per hectare area. | | CO4 | An | 1 |
| 14. | Propagation of plants by the detached vegetative plant parts. | | CO4 | R | 1 |
| 15. | Name one rooting hormone. | | CO1 | R | 1 |
| 16. | Define transplanting shock. | | CO4 | R | 1 |
| 17. | What is orchard? | | CO5 | An | 1 |
| 18. | Define top working. | | CO5 | R | 1 |
| 19. | Name some tropical fruit crops. | | CO4 | R | 1 |
| 20. | What is planting system? | | CO4 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | Write about the square system of planting method. | | CO4 | An | 5 |
| 22. | Briefly explain principles of orchard management. | | CO2 | U | 5 |
| 23. | What is pruning and explain the types of pruning? | | CO3 | R | 5 |
| 24. | What is layering, explain different layering techniques? | | CO3 | An | 5 |
| 25. | Explain about the different types of fertilizer application methods. | | CO4 | R | 5 |
| 26. | Shade management in orchard. | | CO2 | R | 5 |
| 27. | What is nursery and explain different types of nursery? | | CO2 | U | 5 |
| 28. | Distinguish Temperate and tropical climate with suitable examples. | | CO5 | R | 5 |
| 29. | Distinguish sexual and asexual propagation methods. | | CO4 | U | 5 |
| 30. | Write about the mother block management for propagation. | | CO4 | R | 5 |
| 31. | Briefly explain the components of orchard. | | CO4 | R | 5 |
| 32. | Give a detailed note on training and its types in fruit crops. | | CO4 | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Briefly explain the scope and importance of Horticulture. | CO1 | R | 7.5 |
|  | b. | Write the contour planting system. | CO5 | An | 7.5 |
| 34. | a. | Write the orchard rejuvenation methods. | CO2 | R | 7.5 |
|  | b. | What is cutting method of propagation, and preparation of different cuttings? | CO4 | U | 7.5 |
| 35. | a. | What is fertigation, drip irrigation and write about different irrigation methods followed in orchard. | CO4 | U | 7.5 |
|  | b. | List out the fruit crops which are grown in temperate, subtropical and tropical climate condition. | CO5 | R | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Definitions, importance-scope of horticultural crops, branches, methods and techniques. |
| CO2 | Agro climatic zones of India. |
| CO3 | Different methods of plant propagation. |
| CO4 | Different types of planting systems and irrigation, training and pruning. |
| CO5 | Apply principles of orchard management and nursery. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 14.5 | - | - | - | - | - | 14.5 |
| CO2 | 13.5 | 5 | - | - | - | - | 17.5 |
| CO3 | 6 | - | - | 6 | - | - | 10 |
| CO4 | 27 | 20 | - | 6 | - | - | 53 |
| CO5 | 13.5 | 5 | - | 8.5 | - | - | 27 |
| CO6 | - | - | - | - | - | - |  |
|  | | | | | | | **125** |

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| **Course Code** | **18HO2005** | **Duration** | **3hrs** |
| **Course Name** | **SOIL FERTILITY AND NUTRIENT MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | What is hidden hunger? | | CO2 | U | | 1 |
| 2. | pH and EC of saline soil is \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 3. | Define soil fertility. | | CO1 | U | | 1 |
| 4. | What is Humus? | | CO2 | R | | 1 |
| 5. | Define Nutrient Use Efficiency. | | CO3 | U | | 1 |
| 6. | What is Biofertilizer? Give two examples. | | CO2 | R | | 1 |
| 7. | Define Soil productivity. | | CO1 | U | | 1 |
| 8. | What are beneficial elements? | | CO1 | R | | 1 |
| 9. | What are Organic and inorganic forms of Nitrogen? | | CO2 | U | | 1 |
| 10. | List out few toxic elements in soils. | | CO6 | An | | 1 |
| 11. | What is biofertilizer? Give two examples | | CO5 | U | | 1 |
| 12. | Bitter pit in apple is caused due to \_\_\_\_\_\_\_. | | CO2 | A | | 1 |
| 13. | Define mineralisation and immobilisation. | | CO2 | U | | 1 |
| 14. | Explain DRIS. | | CO5 | U | | 1 |
| 15. | Application of \_\_\_\_\_\_\_\_\_\_ is essential for reclamation of sodic soil. | | CO3 | An | | 1 |
| 16. | Criteria of essentiality of nutrients is given by \_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 17. | Expand the given abbreviated words – STCR, INM, IPNM. | | CO4 | R | | 1 |
| 18. | FYM contain \_\_\_\_\_\_\_\_\_\_\_ percentage if N. | | CO4 | An | | 1 |
| 19. | N deficiency in banana causes \_\_\_\_\_\_\_\_\_\_ symptoms. | | CO2 | A | | 1 |
| 20. | Infer on reclamation for acid soil. | | CO2 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Write down the physiological role of major nutrient in plant. | | CO1 | | An | 5 |
| 22. | Explain transformation of S in soil. | | CO2 | | U | 5 |
| 23. | Give a detailed account on Nitrogenous fertilizers and its classification. | | CO3 | | U | 5 |
| 24. | Enumerate the micronutrient deficiency in plants. | | CO1 | | U | 5 |
| 25. | List the factors affecting soil fertility. | | CO4 | | An | 5 |
| 26. | Write the classifications of Bio fertilizer and explain in brief. | | CO5 | | U | 5 |
| 27. | Explain Fertilizer control order and its regulations in a brief manner. | | CO4 | | R | 5 |
| 28. | Explain the functions and deficiency symptoms of Major Nutrients. | | CO2 | | An | 5 |
| 29. | Describe the methods of fertilizer application. | | CO6 | | U | 5 |
| 30. | Explain the evaluation methods of soil fertility. | | CO4 | | U | 5 |
| 31. | Define salt affected soil. Mention its characteristics and management. | | CO6 | | An | 5 |
| 32. | Write the importance of C: N ratio and pH in plant nutrition. | | CO3 | | A | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain in detail the Integrated Plant Nutrient Management. | CO6 | | U | 8 |
|  | b. | Explain in detail the characters of saline soil and its management. | CO6 | | An | 7 |
| 34. | a. | Given a detailed notes on nutrient deficiency symptoms of essential plant nutrient and their corrective measures. | CO1 | | U | 8 |
|  | b. | Write an essay on the various methods of soil fertility evaluation. | CO4 | | U | 7 |
| 35. | a. | Explain the classification, composition and properties of organic manures. | CO3 | | A | 8 |
|  | b. | Elucidate Transformation Dynamics of Phosphorus and potassium in soil. | CO3 | | U | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Elucidate the role of essential nutrients in various kinds of horticultural crop. | | | | | | | |
| CO2 | Capable to identify the nutrient deficiency symptoms on different plants parts. | | | | | | | |
| CO3 | Aware of different sources of nutrient supply to the plants. | | | | | | | |
| CO4 | Demonstrate the soil testing and soil fertility evaluation. | | | | | | | |
| CO5 | Analyze the importance of Bio fertilizers in crop nutrition. | | | | | | | |
| CO6 | Familiar with the concept Integrated Nutrient Management in restoring soil fertility. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 2 | 15 | 0 | 5 |  |  | 22 |
| CO2 | | 3 | 9 | 2 | 5 |  |  | 19 |
| CO3 | | 0 | 13 | 13 | 1 |  |  | 27 |
| CO4 | | 6 | 12 | 0 | 6 |  |  | 24 |
| CO5 | | 0 | 7 | 0 | 0 |  |  | 7 |
| CO6 | | 0 | 13 | 0 | 13 |  |  | 26 |
|  | | | | | | | | **125** |

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| **Course Code** | **18HO2013** | **Duration** | **3hrs** |
| **Course Name** | **PRINCIPLES OF ORNAMENTAL HORTICULTURE AND LANDSCAPE ARCHITECTURE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | Name one famous contemporary gardens developed in independent India. | | CO3 | R | 1 |
| 2. | Name one utility structures proposed in landscape design. | | CO1 | R | 1 |
| 3. | Name one structures proposed for elevation changes in landscape design. | | CO1 | R | 1 |
| 4. | Name one garden adornments proposed in landscape design. | | CO1 | R | 1 |
| 5. | Name one style of flower arrangement. | | CO4 | R | 1 |
| 6. | Name one flowering shrub with botanical names for landscaping in tropical climate. | | CO2 | R | 1 |
| 7. | Name one tree with botanical name suitable for bonsai. | | CO2 | R | 1 |
| 8. | Name one indoor foliage plants with botanical names. | | CO2 | R | 1 |
| 9. | Write the locations of famous Rock garden. | | CO3 | R | 1 |
| 10. | *Nelumbo nucifera* is suitable for \_\_\_\_\_\_\_\_\_\_\_\_garden. | | CO2 | R | 1 |
| 11. | List one disadvantages of using CAD in landscaping. | | CO6 | R | 1 |
| 12. | \_\_\_\_\_\_\_\_\_\_\_\_ is the national flower of India. | | CO5 | R | 1 |
| 13. | Grouping of shrubs in one place is termed as \_\_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | 1 |
| 14. | Mughal gardens follow\_\_\_\_\_\_\_\_\_\_\_\_ style design. | | CO1 | R | 1 |
| 15. | \_\_\_\_\_\_\_\_\_\_\_\_and\_\_\_\_\_\_\_\_\_\_\_\_ are Islamic style gardens. | | CO3 | R | 1 |
| 16. | Rashtrapathibhavan garden was designed by \_\_\_\_\_\_\_\_\_\_\_\_style. | | CO3 | R | 1 |
| 17. | Stone lantern is a regular feature of \_\_\_\_\_\_\_\_\_\_\_\_ garden. | | CO3 | R | 1 |
| 18. | Define landscaping. | | CO1 | R | 1 |
| 19. | Define bio aesthetic planning. | | CO5 | R | 1 |
| 20. | Define arboriculture. | | CO2 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | Differentiate between formal and informal style landscape design. | | CO1 | An | 5 |
| 22. | Differentiate between edges and hedges with examples of plants used. | | CO2 | An | 5 |
| 23. | Briefly explain the various maintenance and aftercare operations for lawn grass. | | CO4 | U | 5 |
| 24. | Briefly discuss the features of Cacti and Succulents with examples. | | CO2 | An | 5 |
| 25. | Briefly discuss hardscape components employed in landscaping. | | CO5 | C | 5 |
| 26. | Briefly discuss landscaping of educational institutions. | | CO5 | C | 5 |
| 27. | Briefly discuss the method and plants used in vertical garden. | | CO4 | C | 5 |
| 28. | Briefly discuss about roof garden and its establishment. | | CO4 | C | 5 |
| 29. | Briefly discuss about terrarium and bottle garden. | | CO4 | C | 5 |
| 30. | Briefly discuss the features of English style garden. | | CO3 | C | 5 |
| 31. | Enumerate bonsai design styles. | | CO4 | U | 5 |
| 32. | Explain the features of water garden. | | CO3 | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | What isindoor scaping? What are the constraints, design considerations, planting materials used and the maintenance operations for indoor gardens? | CO2 | R | 7.5 |
|  | b. | Discuss in detail about home landscaping. | CO5 | C | 7.5 |
| 34. | a. | Elaborate the lawn grass planting methods. | CO4 | U | 7.5 |
|  | b. | Discuss the functional role of shrubs and trees in landscaping. | CO2 | C | 7.5 |
| 35. | a. | Describe the steps involved in planning and lay out of landscape projects. | CO6 | U | 7.5 |
|  | b. | What are the various components that can be included in urban landscaping? What are the precautions to be made in selecting plants for urban landscaping? | CO6 | U | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the principles of ornamental horticulture and landscape design |
| CO2 | Explain about the different ornamental crops and its suitability to different landscapes |
| CO3 | Distinguish the different garden types of India and in abroad |
| CO4 | Design the lawns, floral arrangements, terrariums, xeriscaping and bonsai making |
| CO5 | Discover different landscaping designs and architectures using AutoCAD and ArchCAD |
| CO6 | Identify the factors affecting the landscape design and planning |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5.0 | - | - | 5.0 | - | - | 10.0 |
| CO2 | 13.5 | - | - | 10.0 | - | 7.5 | 31.0 |
| CO3 | 5.0 | 5.0 | - | - | - | 5.0 | 15.0 |
| CO4 | 1.0 | 17.5 | - | - | - | 15.0 | 33.5 |
| CO5 | 2.0 | - | - | - | - | 17.5 | 19.5 |
| CO6 | 1.0 | 15.0 | - | - | - | - | 16.0 |
|  | | | | | | | **125** |

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| **Course Code** | **18HO2014** | **Duration** | **3hrs** |
| **Course Name** | **DRYLAND HORTICULTURE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Define dryland horticulture. | | | CO1 | R | | 1 |
| 2. | What are green manure crops? | | | CO3 | C | | 1 |
| 3. | Define mulching. | | | CO2 | R | | 1 |
| 4. | What is rain water harvesting? | | | CO2 | C | | 1 |
| 5. | Define soil erosion. | | | CO3 | R | | 1 |
| 6. | Mention the unit of measuring evapo-transpiration. | | | CO2 | R | | 1 |
| 7. | Define farm ponds. | | | CO2 | R | | 1 |
| 8. | List out two drought resistant fruit crops. | | | CO5 | R | | 1 |
| 9. | Define sprinkler irrigation. | | | CO2 | R | | 1 |
| 10. | Define Horti pastoral system. | | | CO4 | R | | 1 |
| 11. | Write the full form of ICRISAT. | | | CO1 | R | | 1 |
| 12. | Define Agri silviculture. | | | CO4 | R | | 1 |
| 13. | What is alley cropping? | | | CO4 | C | | 1 |
| 14. | Name the fruit rich in vitamin C. | | | CO3 | R | | 1 |
| 15. | Define strip cropping. | | | CO4 | R | | 1 |
| 16. | Define synthetic mulch. | | | CO4 | R | | 1 |
| 17. | Write the full form of GIS. | | | CO1 | R | | 1 |
| 18. | Define scooping. | | | CO4 | R | | 1 |
| 19. | What is compartmental bunding? | | | CO4 | C | | 1 |
| 20. | Define contour farming. | | | CO4 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Discuss soil erosion and the methods followed to avoid soil erosion in orchard. | | | CO3 | | U | 5 |
| 22. | Discuss the strategies for drought management in fruit crops. | | | CO1 | | U | 5 |
| 23. | List out the methods used to reduce evaporation. | | | CO2 | | R | 5 |
| 24. | List out the advantages of wind breaks and shelterbelts. | | | CO3 | | R | 5 |
| 25. | Discuss the special adaptations noticed in fruit crops. | | | CO5 | | U | 5 |
| 26. | Mention the advantages and disadvantages of tillage. | | | CO4 | | R | 5 |
| 27. | Write in detail on wind erosion and its mechanism. | | | CO3 | | R | 5 |
| 28. | Discuss the factors affecting fertilizer use efficiency. | | | CO4 | | U | 5 |
| 29. | Mention the factors responsible for establishment of an optimum plant population. | | | CO6 | | R | 5 |
| 30. | Explain the effect of mulches on soil properties. | | | CO4 | | U | 5 |
| 31. | Difference between rainfed farming and dry land farming. | | | CO3 | | An | 5 |
| 32. | Write the advantages of alternative land use Systems. | | | CO4 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Discuss the limitations of dryland horticulture. | CO1 | | U | 7.5 |
|  | | b. | Discuss the effect of drought in plants. | CO1 | | U | 7.5 |
| 34. | | a. | Describe biological and mechanical methods of soil conservation. | CO3 | | E | 7.5 |
|  | | b. | Discuss the concept of watershed management. | CO2 | | U | 7.5 |
| 35. | | a. | Write the importance and scope of dryland horticulture. | CO1 | | R | 7.5 |
|  | | b. | Discuss about the new technologies followed in dryland horticulture for crop production. | CO4 | | A | 7.5 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Remember the scenario of dryland horticulture in India. | | | | | | | |
| CO2 | Explain different water conservation techniques used. | | | | | | | |
| CO3 | Acquire the knowledge on different crops suitable to dryland areas. | | | | | | | |
| CO4 | Apply dryland farming techniques for various agro climatic regions. | | | | | | | |
| CO5 | Identify the suitable drought resistant crops. | | | | | | | |
| CO6 | Develop special package of practices for dryland horticultural crops. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** | |
| CO1 | | 10.5 | 20 | - | - | - | - | 30.5 | |
| CO2 | | 9 | 7.5 | - | - | - | 1 | 17.5 | |
| CO3 | | 12 | 5 | - | 5 | 7.5 | 1 | 30.5 | |
| CO4 | | 16 | 10 | 7.5 | - | - | 2 | 35.5 | |
| CO5 | | 1 | 5 | - | - | - | - | 6 | |
| CO6 | | 5 | - | - | - | - | - | 5 | |
|  | | | | | | | | **125** | |

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| **Course Code** | **20AG1002** | **Duration** | **3hrs** |
| **Course Name** | **INTRODUCTORY AGRO-METEOROLOGY & CLIMATE CHANGE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Expand IITM. | | CO1 | U | | 1 |
| 2. | Define Meteorology. | | CO1 | R | | 1 |
| 3. | The stratosphere layer of atmosphere is also called\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | Define Artificial rain making. | | CO2 | R | | 1 |
| 5. | Expand IMD. | | CO2 | U | | 1 |
| 6. | Define Agricultural meteorology. | | CO2 | R | | 1 |
| 7. | Give the different forms of precipitation. | | CO3 | U | | 1 |
| 8. | Give the formula for photothermal unit. | | CO3 | R | | 1 |
| 9. | Define optimum temperature. | | CO3 | U | | 1 |
| 10. | Brief about land breeze. | | CO4 | U | | 1 |
| 11. | Expand the term SWM. | | CO4 | U | | 1 |
| 12. | The \_\_\_\_\_\_is the imaginary lines joins the places having the same rainfall. | | CO4 | R | | 1 |
| 13. | Brief about hydrological Drought. | | CO5 | R | | 1 |
| 14. | Define greenhouse effect. | | CO5 | R | | 1 |
| 15. | The role of ozone layer is\_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 16. | Define Relative humidity. | | CO6 | R | | 1 |
| 17. | Give the formula for GDD. | | CO6 | U | | 1 |
| 18. | The \_\_\_\_\_\_is the imaginary lines joins the places having the same atmospheric pressure. | | CO1 | R | | 1 |
| 19. | Expand the term ITCZ. | | CO2 | U | | 1 |
| 20. | Give the types of weather forecasting. | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Differentiate (i) cyclone and anticyclone (ii) Mountain wind and valley wind with neat diagram. | | CO2 | | U | 5 |
| 22. | Write the different process for transfer of heat energy. | | CO4 | | U | 5 |
| 23. | Explain sea breeze and land breeze with a neat diagram. | | CO2 | | A | 5 |
| 24. | Define (i) Weather (ii) Climate (iii) Agricultural Meteorology  (iv) Meteorology (v) Ozone layer. | | CO6 | | A | 5 |
| 25. | Define solar radiation and its impacts on agriculture. | | CO5 | | U | 5 |
| 26. | Discuss impact of climate change in agriculture. | | CO3 | | A | 5 |
| 27. | Explain GHG effect. | | CO1 | | R | 5 |
| 28. | Describe radiation laws. | | CO3 | | R | 5 |
| 29. | Define micro meteorology and its impacts on agriculture. | | CO2 | | R | 5 |
| 30. | Discuss different types of weather forecasting and its uses in agriculture. | | CO3 | | U | 5 |
| 31. | Write the different types of precipitation with a diagram. | | CO5 | | U | 5 |
| 32. | Write the cloud seeding and its types. | | CO5 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss major monsoon mechanism in India. | CO3 | | U | 8 |
|  | b. | Explain the different agro climatic zones of India. | CO3 | | R | 7 |
|  |  |  |  | |  |  |
| 34. | a. | Explain the different types of droughts and its impact on agriculture. | CO1 | | R | 7 |
|  | b. | Explain in detail the permanent wind and pressure belt of the earth with a neat diagram. | CO4 | | A | 8 |
|  |  |  |  | |  |  |
| 35. | a. | Explain in detail the different layers of atmosphere with neat diagram. | CO2 | | U | 7 |
|  | b. | Discuss the types of meteorology with its scope and importance. | CO3 | | U | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the significance of agricultural metrology, climate and weather. |
| CO2 | Discuss the various atmospheric weather variables and its significance in crop production. |
| CO3 | Understand crop weather relationships for efficient crop production. |
| CO4 | Acquire knowledge on weather forecasting techniques and effect of climate change on crop  Production. |
| CO5 | Describe artificial rainmaking, precipitation, monsoons and its importance in Indian Agriculture. |
| CO6 | Discuss global warming, and its effect on regional and national agriculture. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 15 | 1 |  |  |  |  | 16 |
| CO2 | 7 | 14 | 5 |  |  |  | 26 |
| CO3 | 13 | 23 | 5 |  |  |  | 41 |
| CO4 | 1 | 8 | 8 |  |  |  | 17 |
| CO5 | 2 | 15 |  |  |  |  | 17 |
| CO6 | 1 | 2 | 5 |  |  |  | 8 |
|  | | | | | | | **125** |

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| **Course Code** | **20AG1005** | **Duration** | **3hrs** |
| **Course Name** | **INTRODUCTORY TO FORESTRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Expand ICFRE. | | CO5 | R | | 1 |
| 2. | Mention the botanical name of casuarinas. | | CO1 | R | | 1 |
| 3. | Name two fuel wood tree species. | | CO2 | U | | 1 |
| 4. | When was the forest conservation Act passed? | | CO6 | R | | 1 |
| 5. | What is the total percentage of open forest in India? | | CO2 | R | | 1 |
| 6. | Botanical name of palmyrah. | | CO2 | R | | 1 |
| 7. | Who introduced taungya system? | | CO1 | U | | 1 |
| 8. | Name any two fodder tree species. | | CO5 | R | | 1 |
| 9. | Where is the headquarters of Institute of Forest Biodiversity? | | CO2 | R | | 1 |
| 10. | What are the components of silvo-pasture? | | CO4 | R | | 1 |
| 11. | List out any two deciduous tree. | | CO6 | U | | 1 |
| 12. | Write the botanical name of banyan tree. | | CO4 | U | | 1 |
| 13. | What is the percentage of wind speed reduction in windbreak? | | CO3 | R | | 1 |
| 14. | Mention any two woody tree species. | | CO1 | U | | 1 |
| 15. | Which tree is called king of tree? | | CO1 | U | | 1 |
| 16. | What are the components of silvi-olericulture? | | CO2 | R | | 1 |
| 17. | National tree of India is \_\_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO1 | U | | 1 |
| 18. | Name any two herbaceous tree species. | | CO4 | U | | 1 |
| 19. | What are the components of horti-pasture? | | CO5 | R | | 1 |
| 20. | Where the taungya system was first evolved? | | CO1 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Write about the shelterbelt. | | CO2 | | E | 5 |
| 22. | Detailed note on role of forestry. | | CO2 | | U | 5 |
| 23. | Differentiate reforestation and afforestation. | | CO1 | | E | 5 |
| 24. | Classify the forestry based on evergreen and deciduous tree. | | CO6 | | U | 5 |
| 25. | Define pollarding and write the advantages. | | CO4 | | E | 5 |
| 26. | Differentiate silvipasture and agroforestry. | | CO6 | | U | 5 |
| 27. | Write the concept of agroforestry. | | CO1 | | E | 5 |
| 28. | Discuss about the coppicing and its advantages. | | CO4 | | U | 5 |
| 29. | Write a detailed note on shifting cultivation. | | CO3 | | E | 5 |
| 30. | Detailed note on taungya system. | | CO3 | | U | 5 |
| 31. | Differentiate nutrient cycle and carbon cycle. | | CO5 | | E | 5 |
| 32. | Differentiate even age forest and uneven age forest. | | CO4 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss the objective and importance of silviculture. | CO3 | | R | 8 |
|  | b. | Give a detailed note on limitation of forestry. | CO4 | | E | 7 |
| 34. | a. | Write a detailed note on carbon sequestration and climate change. | CO2 | | E | 8 |
|  | b. | Discuss the concept and importance of social forestry. | CO5 | | R | 7 |
| 35. | a. | Discuss the type of forest in India. | CO2 | | U | 8 |
|  | b. | Explain the artificial regeneration. | CO6 | | E | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the forest eco system and forest regeneration. |
| CO2 | Remember the concepts of agroforestry practiced in various agro ecosystems. |
| CO3 | Apply the knowledge for developing agro forestry, wind breaks, shelter belts, silviculture and social forestry. |
| CO4 | Recall the multipurpose trees in agroforestry systems. |
| CO5 | Analyze the impact of nitrogen fixation, carbon sequestration and develop strategies for climate mitigation. |
| CO6 | Explain the beneficial effects of agro forestry in relation to nitrogen fixation, soil conservation, litter dynamics and nutrient cycles. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 4 |  |  | 10 |  | **16** |
| CO2 | 4 | 14 |  |  | 13 |  | **31** |
| CO3 | 9 | 5 |  |  | 5 |  | **19** |
| CO4 | 1 | 12 |  |  | 12 |  | **25** |
| CO5 | 10 | 0 |  |  | 5 |  | **15** |
| CO6 | 1 | 11 |  |  | 7 |  | **19** |
|  | | | | | | | **125** |

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| **Course Code** | **20AG1006** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF SOIL SCIENCE** | **Max Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome / Bloom’s Level** | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | | |
| 1. | What is weathering? | | CO1/U | 1 |
| 2. | Define soil. | | CO 2/R | 1 |
| 3. | The size of the silt particles is \_\_\_\_\_\_\_\_\_\_\_. | | CO1/R | 1 |
| 4. | Given an example for 2:1:1 clay minerals. | | CO1/A | 1 |
| 5. | Define CEC. | | CO4/A | 1 |
| 6. | The pH of the acid and saline soil is \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_. | | CO3/1 | 1 |
| 7. | Define colloids. | | CO4/R | 1 |
| 8. | Differentiate bulk density and particle density. | | CO4/An | 1 |
| 9. | List out any five orders of soil taxonomy | | CO2/A | 1 |
| 10. | The unit of expression of EC is \_\_\_\_\_\_\_\_\_\_. | | CO3/A | 1 |
| 11. | The major soil type of India is \_\_\_\_\_\_\_\_\_\_. | | CO2/U | 1 |
| 12. | A V-shaped cut for soil sample collection at \_\_\_\_\_\_\_\_\_ depth is given for surface soil sampling collection. | | CO2/An | 1 |
| 13. | What are all the active soil forming factors? | | CO1/R | 1 |
| 14. | Who is called as father of soil science? | | CO1/R | 1 |
| 15. | Define desalinization. | | CO2/U | 1 |
| 16. | Which soil texture is best suited for agricultural purpose? | | CO5/R | 1 |
| 17. | Value denotes \_\_\_\_\_in soil colour | | CO5/U | 1 |
| 18. | Differentiate between soil profile and horizon. | | CO1/U | 1 |
| 19. | List out some elements which cause soil pollution. | | CO6/A | 1 |
| 20. | \_\_\_\_\_\_\_\_ is called as the flesh of the soil. | | CO1/An | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | List out soil forming factors. | | CO5/An | 5 |
| 22. | Classify clay minerals with suitable examples. | | CO1/U | 5 |
| 23. | Enumerate the characteristics of acid, saline and alkali soils. | | CO3/A | 5 |
| 24. | Explain the specific pedogenic process in a brief manner. | | CO1/U | 5 |
| 25. | What is biota? | | CO4/U | 5 |
| 26. | Discuss the importance of soil colour in a short manner. | | CO2/R | 5 |
| 27. | Explain ion exchange mechanisms. | | CO1/An | 5 |
| 28. | Write down the nature, properties and significance of clay colloids. | | CO5/A | 5 |
| 29. | Give short notes on soil pollution. | | CO6/U | 5 |
| 30. | Define pH and enumerate its significance on nutrient availability. | | CO4/U | 5 |
| 31. | Explain the interaction among soil microorganism and its beneficial and harmful effects on soil health. | | CO5/A | 5 |
| 32. | Discuss chemical weathering in a short manner. | | CO1/R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Write in detail about soil texture and their significance in agriculture. | CO1/U | 9 |
| b. | Explain the properties of soil colloids. | CO3/U | 6 |
| 34. | a. | Discuss the classification of soil water and the factors affecting them. | CO4/A | 6 |
| b. | Give a detailed note on biological weathering process and its classification. | CO2/R | 9 |
| 35. | a. | Elaborate the soil forming process and factors. | CO1/U | 8 |
| b. | Elaborate the zonality concept of soil classification. | CO2/An | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the genesis, pedological and edaphological concepts of soil. | | | | | | | |
| CO2 | Remember different systems of soil classification. | | | | | | | |
| CO3 | Evaluate the soil chemical properties and use them for soil reclamation. | | | | | | | |
| CO4 | Gain knowledge on physical properties of Soil. | | | | | | | |
| CO5 | Apply the knowledge for choosing crops and Irrigation systems. | | | | | | | |
| CO6 | Analyze the soil pollutant factors and recommending suitable remedial measures for soil improvement. | | | | | | | |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 8 | 29 | 1 | 6 | - | - | 44 |
| CO2 | | 15 | 2 | 1 | 8 | - | - | 26 |
| CO3 | | - | 7 | 6 | - | - | - | 13 |
| CO4 | | 1 | 10 | 7 | 1 | - | - | 19 |
| CO5 | | 1 | 1 | 10 | 5 | - | - | 17 |
| CO6 | | - | - | 5 | 1 | - | - | 6 |
|  | | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **20AG1008** | **Duration** | **3hrs** |
| **Course Name** | **AGRICULTURAL MICROBIOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Name the bacterial structure used for locomotion. | | | CO6 | R | | 1 |
| 2. | In eukaryotic cell the golgi apparatus functions as \_\_\_\_\_\_\_\_\_\_. | | | CO2 | A | | 1 |
| 3. | Secondary metabolites are produced during \_\_\_\_\_\_\_\_\_\_ phase of growth cycle | | | CO2 | An | | 1 |
| 4. | Write an example for free living diazotroph in soil. | | | CO6 | R | | 1 |
| 5. | The enzyme responsible for nitrogen fixation is \_\_\_\_\_\_\_\_\_\_. | | | CO6 | U | | 1 |
| 6. | What is spontaneous generation? | | | CO5 | A | | 1 |
| 7. | Identify the *Bacillus* species having larvicidal activity against mosquito from the given options. a) *Bacillus thuringiensis* b) *Bacillus sphaericus* c) *Bacillus subtilis* | | | CO6 | E | | 1 |
| 8. | The surface of plant roots adhering to soil particles is called as \_\_\_\_\_\_\_\_\_. | | | CO4 | U | | 1 |
| 9. | P solubilization is due to the production of \_\_\_\_\_\_\_\_\_\_ by soil microbes | | | CO4 | A | | 1 |
| 10. | The term ‘phyllosphere’ is coined by \_\_\_\_\_\_\_\_\_\_. | | | CO4 | R | | 1 |
| 11. | What is the role of *lacZ* gene in regulation of lactose metabolism? | | | CO5 | U | | 1 |
| 12. | The terminal electron acceptor of *Klebsiella*sp is NO3. Identify the metabolic process. | | | CO2 | C | | 1 |
| 13. | Who is the father of Industrial Microbiology? | | | CO1 | R | | 1 |
| 14. | Define F+ plasmid? | | | CO5 | An | | 1 |
| 15. | What are psychrophiles? | | | CO 2 | U | | 1 |
| 16. | Name a commercial biofertilizer. | | | CO1 | R | | 1 |
| 17. | Give an example for entomopathogenic fungi. | | | CO 6 | R | | 1 |
| 18. | Virus are called as \_\_\_\_\_\_\_\_\_\_. | | | CO2 | A | | 1 |
| 19. | What is *nod factor’* in legume-rhizobium symbiosis | | | CO 4 | U | | 1 |
| 20. | The *cry* protein expressed in Bt brinjal is \_\_\_\_\_\_\_\_\_\_. | | | CO6 | A | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Briefly explain Nitrogen cycle and its role in soil fertility. | | | CO4 | | A | 5 |
| 22. | What are Bacterial bio pesticides? Elucidate their mode of action with a neat sketch. | | | CO6 | | U | 5 |
| 23. | Give any two contribution of the following scientists: a) Louis Pasteur; b) Robert Koch . | | | CO1 | | R | 5 |
| 24. | Define transduction and explain the process. | | | CO5 | | C | 5 |
| 25. | Explain the different types of sterilization methods with examples. | | | CO2 | | E | 5 |
| 26. | Differentiate plasmid and Transposon. | | | CO2 | | An | 5 |
| 27. | Define and give examples.  Chemo-autotrophs and chemo-organotrophs. | | | CO3 | | A | 5 |
| 28. | Classify microbes based on temperature requirement with examples. | | | CO2 | | E | 5 |
| 29. | Differentiate between generalized and specialized transduction. | | | CO5 | | An | 5 |
| 30. | Define Agro waste and biodegradation process of common agro waste. | | | CO2 | | C | 5 |
| 31. | What is Glycolysis? Narrate the steps involved using a neat sketch. | | | CO2 | | R | 5 |
| 32. | Write the significance of silage making in fodder conservation. | | | CO6 | | A | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Define conjugation. Explain the types of conjugation with neat sketch. | CO5 | | U | 10 |
|  | | b. | Mention the major eukaryotic cell organelles and their function. | CO 5 | | R | 5 |
| 34. | | a. | Explain the nodulation process in legume-rhizobium symbiosis. | CO4 | | U | 10 |
|  | | b. | Write the significance of mycorrhizal fungi in soil fertility. | CO4 | | A | 5 |
| 35. | | a. | Explain the role of phyllosphere microbes in plant health. | CO4 | | U | 7 |
|  | | b. | Give a brief account on Bio fuel production. | CO3 | | C | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Comprehend the importance and role of microbes in agricultural production. |
| CO2 | Understand principles of microscopy, sterilization techniques and nutrient media preparation. |
| CO3 | Enumerate microbial load in soil and perform isolation, culturing and purification of microbes. |
| CO4 | Describe role of microbes in enhancing soil fertility. |
| CO5 | Analyze genetic improvement of crop plants and transformation methods using microbes. |
| CO6 | Apply knowledge and develop biofertilizers, biopesticides, biofuels, and biowaste degradation. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 7 | - | - | - | - | - | 7 |
| CO2 | 5 | 1 | 2 | 6 | 10 | 6 | 30 |
| CO3 | - | - | 5 | - | - | 8 | 13 |
| CO4 | 1 | 19 | 11 | - | - | - | 31 |
| CO5 | 5 | 11 | 1 | 6 | - | 5 | 28 |
| CO6 | 3 | 6 | 6 | - | 1 | - | 16 |
|  | | | | | | | **125** |

**Graphical user interface, application

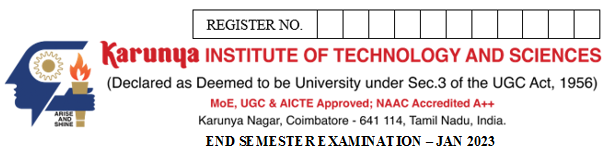
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| **Course Code** | **20AG1010** | **Duration** | **3hrs** |
| **Course Name** | **HUMAN VALUES AND ETHICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Define Values. | | CO1 | U | | 1 |
| 2. | What is philosophy and why is it important? | | CO1 | R | | 1 |
| 3. | What are the three of your most cherished personal values? | | CO1 | U | | 1 |
| 4. | Name two important factors that drives decision making. | | CO3 | R | | 1 |
| 5. | Define principle. | | CO2 | U | | 1 |
| 6. | How will you become more self-aware? | | CO4 | U | | 1 |
| 7. | SWOT stands for \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 8. | Define Contentment. | | CO3 | R | | 1 |
| 9. | * What do you see as the next big trend in agricultural field? | | CO3 | An | | 1 |
| 10. | Define career success. | | CO3 | U | | 1 |
| 11. | Name two qualities for practicing selfless service. | | CO1 | U | | 1 |
| 12. | Recall the importance of serving others. | | CO1 | R | | 1 |
| 13. | Differentiate morality and ethics. | | CO3 | R | | 1 |
| 14. | The SWOT strategy was framed by \_\_\_\_\_\_\_\_\_\_\_ while working in Stanford Research Institute. | | CO2 | R | | 1 |
| 15. | Brief sympathy with an example. | | CO4 | U | | 1 |
| 16. | “Know thyself “is a phrase given by the philosopher \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 17. | Give the vision and mission statement of your course in our institute | | CO3 | R | | 1 |
| 18. | What is an example of vision? | | CO1 | R | | 1 |
| 19. | Define Emotional quotient. | | CO4 | U | | 1 |
| 20. | What are your leadership skills? | | CO6 | An | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Summarize the importance of value based living. | | CO1 | | U | 5 |
| 22. | Explain the benefits of goal setting. | | CO5 | | U | 5 |
| 23. | How does value education helps in fulfilling one’s aspiration? | | CO1 | | An | 5 |
| 24. | Define self-exploration. What is the content of self-exploration? | | CO3 | | U | 5 |
| 25. | What is your present vision of a successful life? | | CO5 | | E | 5 |
| 26. | Illustrate temperament analysis. | | CO4 | | An | 5 |
| 27. | List out the opportunities that align with your professional goal. | | CO5 | | E | 5 |
| 28. | What are the most important attributes of successful leaders today? | | CO6 | | U | 5 |
| 29. | Interpret the importance of having a positive mental attitude in life | | CO4 | | U | 5 |
| 30. | Elaborate the factors that lead to poor decision making. | | CO2 | | A | 5 |
| 31. | Write the steps to set your goals. | | CO5 | | An | 5 |
| 32. | How do you describe leadership qualities in an interview? | | CO6 | | E | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain the role of values in human life and society. | CO1 | | A | 7 |
|  | b. | What is the purpose of your life and explain the principles for a purpose based life? | CO2 | | E | 8 |
| 34. | a. | Discuss the importance of Self Awareness. | CO3 | | U | 7 |
|  | b. | Detail the strategies to develop a positive spirit within yourself. | CO4 | | An | 8 |
| 35. | a. | How will you determine your Positive Attitude Quotient (PAQ)? | CO5 | | U | 7 |
|  | b. | Compare and contrast negative self-talk and positive thinking. | CO3 | | U | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the importance of value based living. |
| CO2 | Gain deeper understanding about the purpose of their life. |
| CO3 | Become value based professionals. |
| CO4 | Lead a balanced life with emotional stability. |
| CO5 | Set realistic goals in life and start working towards them. |
| CO6 | Become leaders with social concern. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 8 | 7 | 5 |  |  | 23 |
| CO2 | 1 | 2 | 5 |  | 8 |  | 16 |
| CO3 | 4 | 22 |  | 1 |  |  | 27 |
| CO4 |  | 8 |  | 13 |  |  | 21 |
| CO5 |  | 12 |  | 5 | 10 |  | 27 |
| CO6 |  | 5 |  | 1 | 5 |  | 11 |
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| **CoruseCode** | **20AG1010** | **Duration :** | **3hrs** |
| **Course Name** | **HUMAN VALUES AND ETHICS** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART-A (20 X 1 =20 MARKS)** | | | | |
| 1. | \_\_\_\_\_\_\_\_\_\_\_\_\_ are positive guiding principles of life. | 1 | R | 1 |
| 2. | \_\_\_\_\_\_\_\_\_\_\_\_\_ goals require several months/years to accomplish. | 1 | R | 1 |
| 3. | \_\_\_\_\_\_\_\_\_\_\_ is the foundation of critical thinking. | 1 | R | 1 |
| 4. | Define self-exploration. | 2 | R | 1 |
| 5. | To grow up, getting married and having kids is an example for \_\_\_\_\_\_\_\_\_ purpose. | 2 | U | 1 |
| 6. | \_\_\_\_\_\_\_\_\_\_\_\_ is the ability to see yourself clearly and objectively through reflection and introspection. | 2 | R | 1 |
| 7. | \_\_\_\_\_\_\_\_\_\_\_\_ inspires positive thinking and hope. | 3 | R | 1 |
| 8. | Expand SWOT. | 3 | R | 1 |
| 9. | Define contentment. | 3 | R | 1 |
| 10. | Sending a thank you note or giving a free hug is a way to express \_\_\_\_\_\_\_. | 3 | U | 1 |
| 11. | Define decision making. | 4 | R | 1 |
| 12. | Intuition is using the facts and figures in front of you to make decisions. (True/False) | 4 | R | 1 |
| 13. | The awareness to act consistently and apply moral convictions to daily behavior is \_\_\_\_\_\_\_\_\_\_\_. | 4 | R | 1 |
| 14. | Bad decisions are both effective and ethical. (True/False) | 4 | U | 1 |
| 15. | The force that drives you to do things is called \_\_\_\_\_\_\_. | 5 | U | 1 |
| 16. | People with fixed mindset believe that talent is ingrained, and that we cannot change our level of ability. (True/False). | 5 | U | 1 |
| 17. | The ability to look on the bright side, or think positive is \_\_\_\_\_\_\_\_. | 5 | R | 1 |
| 18. | HSP feels hurt easily. (True/False) | 6 | U | 1 |
| 19. | Selfless service eliminates ego and purifies mind. (True/False) | 6 | U | 1 |
| 20. | Happiness is an inner state of mind and it depends on external factors or conditions. (True/False) | 6 | U | 1 |

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| **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | Relate ethics and values. | 1 | An | 5 |
| 22. | Elaborate the types of goals. | 1 | R | 5 |
| 23. | Explain the traits of an imposed purpose. | 2 | U | 5 |
| 24. | Explain the importance of Self-Exploration in our life. | 2 | A | 5 |
| 25. | Describe the ways to achieve self-satisfaction. | 2 | U | 5 |
| 26. | What are the ways to express your gratitude for kith and kin? | 3 | A | 5 |
| 27. | Enlist the factors that leads to poor decision making. | 3 | R | 5 |
| 28. | Distuinguish instrinsic and extrinsic motivators. | 4 | E | 5 |
| 29. | What are the ways to develop positive spirit within oneself? | 5 | E | 5 |
| 30. | In daily life, how do you care for your body? | 5 | A | 5 |
| 31. | Categorize the different types of attachment. | 4 | R | 5 |
| 32. | Differentiate IQ, EQ and SQ. | 6 | An | 5 |

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| **PART C(2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Explain the importance of value based living with suitable examples. | 1 | U | 7.5 |
| b. | Describe your visions, missions and goals in life. | 2 | A | 7.5 |
| 34. | a. | How will you make “Ethical decision” when you face difficult choice? | 3 | A | 7.5 |
| b. | Interpret Attachment and Detachment in the context of Indian Society. | 4 | An | 7.5 |
| 35. | a. | How do you practice selfless service in your day-to-day life? | 5 | E | 7.5 |
| b. | Analyse the ethical dimensions of Body, Mind and Soul. | 6 | An | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the importance of value based living. |
| CO2 | Gain deeper understanding about the purpose of their life. |
| CO3 | Become value based professionals. |
| CO4 | Lead a balanced life with emotional stability. |
| CO5 | Set realistic goals in life and start working towards them. |
| CO6 | Become leaders with social concern. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 8 | 7.5 | - | 5 | - | - | 20.5 |
| CO2 | 2 | 11 | 12.5 | - | - | - | 25.5 |
| CO3 | 8 | 1 | 12.5 | - | - | - | 21.5 |
| CO4 | 8 | 1 | - | 7.5 | 5 | - | 21.5 |
| CO5 | 1 | 2 | 5 | - | 12.5 | - | 20.5 |
| CO6 | - | 3 | - | 12.5 |  |  | 15.5 |
|  | | | | | | | **125** |

**Graphical user interface, application

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| **Course Code** | **20AG2003** | **Duration** | **3hrs** |
| **Course Name** | **ENTREPRENEURSHIP DEVELOPMENT AND**  **BUSINESS COMMUNICATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | “Micro” enterprise refers to the unit having investment of Rs. \_\_\_\_\_ crore or less. | | | CO1 | R | | 1 |
| 2. | CRR : Expand. | | | CO1 | R | | 1 |
| 3. | SIPCOT : Expand. | | | CO1 | R | | 1 |
| 4. | What do you understand by the term “Globalization”? | | | CO4 | R | | 1 |
| 5. | What is the main purpose of doing Monitoring & Evaluation (M&E)? | | | CO3 | R | | 1 |
| 6. | What is the significance of Market Research in entrepreneurship process? | | | CO2 | R | | 1 |
| 7. | When was Indian Economy opened up for global investment? | | | CO4 | R | | 1 |
| 8. | “Locus of Control”: What it means to an entrepreneur? | | | CO1 | R | | 1 |
| 9. | Name an industry for which Industrial Licensing was not relaxed in New Economic Policy in 1991. | | | CO4 | R | | 1 |
| 10. | What is Fiscal Policy? | | | CO4 | R | | 1 |
| 11. | What is “Bootstrapping? | | | CO3 | R | | 1 |
| 12. | What is MFI? | | | CO3 | R | | 1 |
| 13. | What is Seed Capital? | | | CO3 | R | | 1 |
| 14. | What is Vision Vs Mission? | | | CO6 | R | | 1 |
| 15. | Expand SIDO. | | | CO6 | R | | 1 |
| 16. | Mention the four roles played by entrepreneurship development process to help an individual become an entrepreneur. | | | CO1 | R | | 1 |
| 17. | What is defined as the desire to achieve a goal or a certain performance level, leading to goal-directed behavior? | | | CO6 | U | | 1 |
| 18. | Name the function which is basic for all other management functions | | | CO1 | U | | 1 |
| 19. | \_\_\_\_\_\_\_\_\_\_ *skills* are the abilities to stay focused on different tasks and use your time, energy, strength, mental capacity, physical space, etc. effectively and efficiently in order to achieve the desired outcome. | | | CO2 | U | | 1 |
| 20. | \_\_\_\_\_\_\_\_\_ is the regular, systematic collection and analysis of information to track the progress of programme implementation against pre-set targets and objectives. | | | CO2 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Discuss the characteristics of Entrepreneurs. | | | CO1 | | Cr | 5 |
| 22. | Outline achievement Motivation. | | | CO1 | | U | 5 |
| 23. | Explain Liberal Economic Policies introduced for entrepreneurship development. | | | CO4 | | R | 5 |
| 24. | Discuss on “Make in India” initiative in our country. | | | CO2 | | Cr | 5 |
| 25. | Illustrate and explain the Entrepreneurial Process. | | | CO3 | | U | 5 |
| 26. | What are the Leadership Skills expected of an entrepreneur? Write brief note on each of them. | | | CO3 | | R | 5 |
| 27. | What are the scope and importance of Agricultural Supply Chain? | | | CO6 | | R | 5 |
| 28. | Describe three Phases of EDP – Pre-Training, Training and Post-Training. | | | CO1 | | U | 5 |
| 29. | What are the aspects that are incorporated in a Project Report? | | | CO6 | | R | 5 |
| 30. | Explain a few ways of problem solving. | | | CO5 | | U | 5 |
| 31. | Assess the factors conducive to India's Economic Growth for entrepreneurship. | | | CO4 | | E | 5 |
| 32. | Distinguish between an entrepreneur and a business man. | | | CO1 | | An | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Elaborate different types of Motivation. | CO1 | | Cr | 8 |
|  | | b. | Explain the role of Entrepreneurs in Economic Development. | CO4 | | U | 7 |
| 34. | | a. | Describe in detail POSDCoRB functions of Management. | CO2 | | U | 8 |
|  | | b. | Identify and explain organizational Skills expected of an entrepreneur. | CO5 | | A | 7 |
| 35. | | a. | Explain different sources of financing enterprises. | CO3 | | U | 8 |
|  | | b. | Discuss on Total Quality Management (TQM). | C06 | | Cr | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Distinguish different entrepreneurial traits and skills. |
| CO2 | Know the agribusiness opportunities open for agriculture graduates |
| CO3 | Apply the leadership skills to get financial support for start-ups |
| CO4 | Understand the impact of economic reforms in agri-business |
| CO5 | Perform SWOT analysis of an entity for any prospective agribusiness/ideas |
| CO6 | Formulate business proposal for successful implementation of the business plan |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | 11 |  | 5 |  | 13 | 34 |
| CO2 | 1 | 10 |  |  |  | 5 | 16 |
| CO3 | 9 | 13 |  |  |  |  | 22 |
| CO4 | 9 | 7 |  |  | 5 |  | 21 |
| CO5 |  | 5 | 7 |  |  |  | 12 |
| CO6 | 12 | 1 |  |  |  | 7 | 20 |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **20AG2007** | **Duration** | **3hrs** |
| **Course Name** | **GEOINFORMATICS AND NANOTECHNOLOGY AND PRECISION FARMING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1 | Precision agriculture is the application of technologies and principles to manage \_\_\_\_and \_\_\_\_\_variability associated with all aspects of agricultural production for the purpose of improving crop performance and environmental quality. | | CO1 | R | 1 |
| 2 | \_\_\_\_\_\_\_\_ is a framework or software for gathering, managing, and analyzing data, which analyses spatial location and organizes layers of information into visualizations using maps and 3D scenes. | | CO2 | U | 1 |
| 3 | List any two challenges of precision farming for Indian agriculture. | | CO2 | A | 1 |
| 4 | \_\_\_\_\_\_\_\_\_\_\_ is a process where the crop production inputs (water, nutrients, and chemical) rate are changed within the field in response to variable factors that affect the optimum rate of application. | | CO3 | R | 1 |
| 5 | \_\_\_\_\_\_\_\_ is the acquisition of information about a phenomenon or a physical object without making any real contact, typically from aircraft or satellites. | | CO4 | U | 1 |
| 6 | Name the sensors which determine the latitude, longitude and altitude of any position within a required area, with the help of GPS satellites. | | CO4 | R | 1 |
| 7 | \_\_\_\_\_\_\_\_\_ refers to the process of collecting georeferenced data on crop yield and characteristics, such as moisture content, while the crop is being harvested. | | CO1 | U | 1 |
| 8 | What is the abbreviation for GIS? | | CO3 | R | 1 |
| 9 | "Yamaha RMAX helicopter was the first UAV designed for agriculture spraying operation which is a remotely-piloted helicopter model". Identify whether this statement is true or false. | | CO2 | An | 1 |
| 10 | UAV with eight rotors or propellers is called as \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | A | 1 |
| 11 | “Remotely Piloted Aerial System” (RPAS) or "Remotely Piloted Aircraft" (RPA) in the aviation industry refers to \_\_\_\_\_\_\_. | | CO2 | R | 1 |
| 12 | Drones of weight from 250 grams to 2kg has been categorized as \_\_\_\_\_\_\_\_ drones. | | CO2 | R | 1 |
| 13 | \_\_\_\_\_\_\_\_\_\_\_\_ is a modern technology that provides accurate means of measuring the extent and pattern of changes and other related information about the environment. | | CO4 | U | 1 |
| 14 | \_\_\_\_\_\_\_\_\_\_ is a branch of geoinformaticsfocusing on the study of acquisition, processing, management, and applications of agro-geoinformation. | | CO3 | R | 1 |
| 15 | \_\_\_\_\_\_ is the process of using the maps delivered by geographic information systems(GIS) in the Internet, more specifically in the World Wide Web (WWW). | | CO3 | A | 1 |
| 16 | The remote sensing system that provides their own source of energy or illumination is known as\_\_\_\_\_\_\_\_sensors. | | CO3 | A | 1 |
| 17 | \_\_\_\_\_\_\_\_\_is a set of mathematical equations describing or mimicking the behaviour of a system. | | CO4 | U | 1 |
| 18 | \_\_\_\_\_\_\_\_\_states that growth is dictated not by total resources or nutrients available, but by the scarcest resource/nutrient,i.e. the limiting factor. | | CO5 | R | 1 |
| 19 | \_\_\_\_\_\_\_\_is the design, characterization, production and application of structures, devices and systems by controlling shape and size at the nanoscale. | | CO6 | R | 1 |
| 20 | Particle with one or more dimensions at the nanoscale are called as \_\_\_\_\_\_\_\_\_\_\_. | | CO6 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | What are the uses of GPS in Modern Agricultural Farming? | | CO1 | R | 5 |
| 22. | Briefly explain about Controlled Traffic Farming (CTF). | | CO1 | R | 5 |
| 23. | Briefly explain about yield maps. | | CO1 | U | 5 |
| 24. | What are the challenges in using agricultural drones in India? | | CO2 | U | 5 |
| 25. | Write a brief note on geographic information system. | | CO3 | R | 5 |
| 26. | Write a brief note on cartography. | | CO3 | U | 5 |
| 27 | List down the applications of geoinformatics in precision agriculture. | | CO3 | A | 5 |
| 28 | What are the challenges of using sensors in agriculture? | | CO3 | R | 5 |
| 29 | Define Remote Sensing and how it works? Briefly explain about the characteristics of remote sensing data. | | CO3 | A | 5 |
| 30 | Write a brief note on SPAD Meter and Field Scout CM 1000 meter. | | CO5 | R | 5 |
| 31 | What is Photogrammetry and write a brief note about it? | | CO3 | R | 5 |
| 32. | Write a note on the regulations on pesticides for crop protection by using drones. | | CO2 | An | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Explain about the various applications of UAVs in agriculture. | CO2 | R | 7.5 |
|  | b. | Write elaborately on the regulations for owning and operating drones in India. | CO2 | U | 7.5 |
| 34 | a | Write elaborately on the applications of models in agriculture. | CO4 | U | 7.5 |
|  | b | Elaborate on different types of models | CO4 | R | 7.5 |
| 35 | a | Write a brief note on the following   1. Controlled release of chemical nutrients in fertilizers through nano-coatings. 2. Enhancing the efficiency of biofertilizers by using nanoparticles | CO6 | R | 7.5 |
|  | b | What is STCR and what are the advantages of STCR approach over traditional/blanket recommendations? | CO5 | A | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the concepts of precision farming. |
| CO2 | Demonstrate the use of Unmanned Aerial Vehicle (UAV) in farm operations. |
| CO3 | Enhance their understanding on Geoinformatic principles and the use of GIS, GPS, Sensors and Remote Sensing technologies in agriculture. |
| CO4 | Relate the use of various Crop Simulation Models in crop production. |
| CO5 | Apply the STCR approach for optimizing the fertilizer inputs in precision farming. |
| CO6 | Acquire knowledge on nanotechnology and its uses for scaling-up farm productivity. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 11 | 6 |  |  |  |  | **17** |
| CO2 | 9.5 | 13.5 | 2 | 6 |  |  | **31** |
| CO3 | 18 | 5 | 12 |  |  |  | **35** |
| CO4 | 8.5 | 10.5 |  |  |  |  | **19** |
| CO5 | 6 |  | 7.5 |  |  |  | **13.5** |
| CO6 | 9.5 |  |  |  |  |  | **9.5** |
|  | | | | | | | **125** |

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| --- | --- | --- | --- |
| **Course Code** | **20AG2008** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF PLANT BREEDING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | The centre of origin for coffee is \_\_\_\_\_\_\_\_\_. | | CO1 | U | 1 |
| 2. | Define Cleistogamy. | | CO1 | R | 1 |
| 3. | The concept of pureline was given by. | | CO1 | R | 1 |
| 4. | Genetic constitution of Monosomics is   1. 2n-1 b. 2n-2 c. 2n+1 d. 2n+2 | | CO2 | R | 1 |
| 5. | The concept of centres of origin was given by\_\_\_\_\_\_\_\_\_. | | CO2 | U | 1 |
| 6. | Inbreeding depression is severe in self pollinated crops – True or False | | CO2 | A | 1 |
| 7. | Homozygosity occurs in F6 generation – True or False. | | CO3 | U | 1 |
| 8. | Define Emasculation | | CO3 | R | 1 |
| 9. | The chemical used for polyploidization(doubling of chromosomes) in crops. | | CO3 | U | 1 |
| 10. | Difference between synthetic and composite variety. | | CO4 | U | 1 |
| 11. | Triticale is the cross between \_\_\_\_\_\_\_\_\_ X\_\_\_\_\_\_\_\_\_. | | CO4 | U | 1 |
| 12. | Tag colour of Breeders seed is \_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 13. | The first cotton hybrid is \_\_\_\_\_\_\_\_\_. | | CO5 | R | 1 |
| 14. | Define heterosis. | | CO5 | R | 1 |
| 15. | Dwarf gene in rice is \_\_\_\_\_\_\_\_\_. | | CO6 | U | 1 |
| 16. | Write the difference between primary and secondary introduction of crops. | | CO6 | R | 1 |
| 17. | What is DUS test? | | CO6 | U | 1 |
| 18. | Multiline concept was proposed by \_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_ crop. | | CO1 | R | 1 |
| 19. | Progeny test was proposed by \_\_\_\_\_\_\_\_\_. | | CO2 | U | 1 |
| 20. | Define Hardy Weinberg law. | | CO4 | U | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | List out the physical and chemical mutagens with examples. | | CO1 | An | 5 |
| 22. | Write the classifications of asexual reproduction in crops. | | CO2 | U | 5 |
| 23. | Explain autopolyploids with examples. | | CO3 | An | 5 |
| 24. | Briefly describe EGMS system in plants with suitable diagrams. | | CO4 | U | 5 |
| 25. | What is mutation and explain the different types of mutations. | | CO5 | An | 5 |
| 26. | Briefly elaborate the mechanisms responsible to overcome drought in crops. | | CO1 | An | 5 |
| 27. | Explain the general breeding objectives of crop plants. | | CO2 | U | 5 |
| 28. | Define apomixis and explain the various types occurring in plants. | | CO2 | U | 5 |
| 29. | Explain double fertilization with diagram. | | CO3 | An | 5 |
| 30. | Explain the post fertilization barriers and the methods to overcome. | | CO4 | U | 5 |
| 31. | List out the mechanisms promoting cross pollination in crops. | | CO5 | An | 5 |
| 32. | Draw the structure of ovule and label the parts. | | CO6 | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Elaborate the classifications self-incompatibility in crop plants with suitable diagrams. | CO1 | R | 8 |
|  | b. | What are the methods to overcome self-incompatibility in crops? | CO1 | R | 7 |
| 34. | a. | What is male sterility? Explain the different types of male sterility. | CO2 | U | 8 |
|  | b. | Brief the applications of male sterility in plant breeding. | CO2 | U | 7 |
| 35. | a. | Explain pedigree method of breeding with flow chart. | CO3 | A | 8 |
|  | b. | Write the merits and demerits of Pedigree breeding method in crops. | CO3 | A | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the basic concepts of plant breeding and genetics | | | | | | | |
| CO2 | Remember origin and diversity of different crops, components of inheritance and variations. | | | | | | | |
| CO3 | Apply the knowledge to develop high yielding crops with better quality. | | | | | | | |
| CO4 | Produce varieties and hybrids with host plant resistance. | | | | | | | |
| CO5 | Apply the protocols of intellectual property rights and patenting practically. | | | | | | | |
| CO6 | Analyze Plant Breeders and farmer’s rights for research and commercial seed production of high yielding crops. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 17 | 1 |  | 10 |  |  | 28 |
| CO2 | | 2 | 14 | 11 |  |  |  | 27 |
| CO3 | | 2 | 2 | 15 | 10 |  |  | 29 |
| CO4 | | 1 | 15 |  |  |  |  | 16 |
| CO5 | | 3 |  |  | 10 |  |  | 13 |
| CO6 | | 1 | 11 |  |  |  |  | 12 |
|  | | | | | | | | **125** |

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| **Course Code** | **20AG2009** | **Duration** | **3hrs** |
| **Course Name** | **PRODUCTION TECHNOLOGY OF VEGETABLES AND SPICES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Which deficiency causes blossom end rot of tomato? | | | CO4 | An | | 1 |
| 2. | Define heterostyly. | | | CO1 | R | | 1 |
| 3. | Name the species of amaranthus suitable for grain production. | | | CO4 | R | | 1 |
| 4. | Which deficiency causes brown heart of radish? | | | CO5 | An | | 1 |
| 5. | Name the adulterant used for black pepper. | | | CO4 | R | | 1 |
| 6. | Write the botanical name of clove. | | | CO1 | R | | 1 |
| 7. | Name any two temperate vegetables. | | | CO1 | R | | 1 |
| 8. | Define perennial vegetables. | | | CO1 | R | | 1 |
| 9. | Mention any two varieties of carrot. | | | CO4 | R | | 1 |
| 10. | Name the vegetable rich in iron content. | | | CO1 | R | | 1 |
| 11. | Define intercropping. | | | CO4 | R | | 1 |
| 12. | Write the mode of propagation of potato. | | | CO4 | R | | 1 |
| 13. | Define olericulture. | | | CO1 | R | | 1 |
| 14. | Name the family of cardamom. | | | CO1 | R | | 1 |
| 15. | Which crop is known as king of spice? | | | CO4 | An | | 1 |
| 16. | Mention any two varieties of ginger. | | | CO4 | R | | 1 |
| 17. | Define maturity indices. | | | CO4 | R | | 1 |
| 18. | Write the economic part of black pepper. | | | CO1 | R | | 1 |
| 19. | Define curing. | | | CO4 | R | | 1 |
| 20. | Name 3 species of tree spice. | | | CO1 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Classify the vegetables based on seasons of cultivation. | | | CO2 | | U | 5 |
| 22. | Discuss the cultivation practices of amaranthus. | | | CO4 | | U | 5 |
| 23. | Discuss the varietal wealth of chilli. | | | CO4 | | U | 5 |
| 24. | Describe intercultural practices followed in vegetables. | | | CO4 | | U | 5 |
| 25. | Write a note on kitchen garden and mention the advantages. | | | CO3 | | R | 5 |
| 26. | Difference between determinate and indeterminate varieties of tomato. | | | CO4 | | An | 5 |
| 27. | Discuss the cultivation practices of cucumber. | | | CO4 | | U | 5 |
| 28. | Write the maturity indices of watermelon and muskmelon. | | | CO4 | | R | 5 |
| 29. | Explain the different methods of fertilizer application. | | | CO4 | | U | 5 |
| 30. | Write the difference between Mysore type and Malabar type of cardamom. | | | CO4 | | R | 5 |
| 31. | Discuss the processing of turmeric. | | | CO4 | | U | 5 |
| 32. | Write the difference between orthotropic shoots and plagiotropic shoots in black pepper. | | | CO4 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Discuss the physiological disorders of vegetables. | CO5 | | U | 7.5 |
|  | | b. | Discuss the diseases of spice crops with remedies. | CO5 | | U | 7.5 |
| 34. | | a. | Write the production technology of bitter gourd and sponge gourd. | CO4 | | R | 7.5 |
|  | | b. | Discuss the importance and scope of vegetables and spices. | CO1 | | U | 7.5 |
| 35. | | a. | Explain heterostyly and its types in brinjal. | CO4 | | U | 7.5 |
|  | | b. | Discuss the seed certification standards of cauliflower. | CO6 | | U | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Definition, importance and scope of vegetables and spices. |
| CO2 | Classification of vegetables and spices. |
| CO3 | Understand the concept of kitchen garden. |
| CO4 | Discuss the cultivation practices of vegetables and spices. |
| CO5 | Diseases, pests and disorders of vegetable and spices. |
| CO6 | Understand the procedures involved in seed certification. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | **9** | **7.5** | - | - | - | - | 16.5 |
| CO2 | **-** | **5** | - | - | - | - | 5 |
| CO3 | 5 | - | - | - | - | - | 5 |
| CO4 | 30.5 | 37.5 | - | 7 | - | - | 75 |
| CO5 | - | 15 | - | 1 | - | - | 16 |
| CO6 | - | 7.5 | - | - | - | - | 7.5 |
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| **Course Code** | **20AG2010** | **Duration** | **3hrs** |
| **Course Name** | **PRODUCTION TECHNOLOGY FOR ORNAMENTAL CROPS, MAP AND LANDSCAPING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Define Floriculture. | | CO1 | R | | 1 |
| 2. | Mention any two commercial cut flowers. | | CO1 | R | | 1 |
| 3. | Define disbudding in flower crops. | | CO1 | R | | 1 |
| 4. | Define Fertigation. | | CO1 | R | | 1 |
| 5. | Write two chemical constituent of periwinkle. | | CO3 | R | | 1 |
| 6. | What are commercial flowers, and give two examples? | | CO3 | An | | 1 |
| 7. | Name any two bulbous flowering plants. | | CO2 | R | | 1 |
| 8. | Define shrubs. | | CO1 | R | | 1 |
| 9. | Define transplanting. | | CO1 | R | | 1 |
| 10. | Write the botanical name of rose. | | CO4 | R | | 1 |
| 11. | Write the botanical name of Chrysanthemum. | | CO4 | R | | 1 |
| 12. | Write the botanical name of gladiolus. | | CO4 | R | | 1 |
| 13. | What is pruning in plants? | | CO4 | An | | 1 |
| 14. | What is gulkand? | | CO4 | R | | 1 |
| 15. | Define medicinal plants. | | CO1 | R | | 1 |
| 16. | Write the economical part of asparagus. | | CO4 | R | | 1 |
| 17. | What is processing of MAPs? | | CO5 | An | | 1 |
| 18. | Mention any two distillation methods. | | CO5 | R | | 1 |
| 19. | List any two varieties of jasmine. | | CO4 | R | | 1 |
| 20. | List any two principle constituents of costus. | | CO4 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Give a detailed note on types of marigold with varieties. | | CO4 | | An | 5 |
| 22. | Discuss mode of propagation and planting of gerbera. | | CO4 | | U | 5 |
| 23. | List the different species of tuberose with their characters. | | CO4 | | R | 5 |
| 24. | Discus briefly classification of chrysanthemum. | | CO4 | | An | 5 |
| 25. | Give a note on production aspects of asparagus. | | CO4 | | R | 5 |
| 26. | Discuss propagation aspect in tuberose | | CO5 | | R | 5 |
| 27. | Explain three different species of jasmine with varieties. | | CO5 | | U | 5 |
| 28. | Write the production technology of aloe. | | CO4 | | R | 5 |
| 29. | Discuss pruning, harvesting and yield of rose. | | CO4 | | U | 5 |
| 30. | Write the medicinal uses of aloe, mint and costus. | | CO4 | | R | 5 |
| 31. | Write a note on cultivation aspects of periwinkle. | | CO4 | | R | 5 |
| 32. | Give a detailed note on pinching in marigold. | | CO4 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Write the chemical constituents of aloe vera, periwinkle, costus and ashwagandha. | CO5 | | R | 7.5 |
|  | b. | Write a detailed note on value addition and byproducts of ornamental crops. | CO5 | | An | 7.5 |
| 34. | a. | Explain propagation methods in rose and gerbera. | CO4 | | U | 7.5 |
|  | b. | Explain pinching technique in carnation. | CO4 | | U | 7.5 |
| 35. | a. | Write the principles of landscaping. | CO2 | | R | 7.5 |
|  | b. | Write the importance and scope of ornamental crops and landscaping. | CO1 | | R | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Definitions, importance-scope of horticultural crops, branches, methods and techniques. |
| CO2 | Agro climatic zones of India. |
| CO3 | Different methods of plant propagation. |
| CO4 | Different types of planting systems and irrigation, training and pruning. |
| CO5 | Apply principles of orchard management and nursery. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 14.5 | - | - | - | - | - | 20 |
| CO2 | 7.5 | - | - | - | - | - | 10.5 |
| CO3 | 1 | - | - | 1 | - | - | 2 |
| CO4 | 37 | 25 | - | 11 | - | - | 73 |
| CO5 | 13.5 | 5 | - | 8.5 | - | - | 19.5 |
| CO6 | - | - | - | - | - | - |  |
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| **Course Code** | **20AG2013** | **Duration** | **3hrs** |
| **Course Name** | **PRINCIPLES OF SEED TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Physiological maturation symptom for brinjal is \_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 2. | Physiological maturation symptom for chilli is \_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 3. | Which tag colour was prescribed for foundation seed? | | CO2 | A | | 1 |
| 4. | Protective layer in seed is called as \_\_\_\_\_\_\_\_. | | CO3 | A | | 1 |
| 5. | Physiological maturation symptom for black gram is\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 6. | \_\_\_\_\_\_\_\_ is the best method for tomato seed extraction. | | CO3 | R | | 1 |
| 7. | Physiological maturation symptom for paddy \_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 8. | Which tag colour was prescribed for breeder seed? | | CO2 | R | | 1 |
| 9. | What is method of seed production used to produce carrot seeds? | | CO3 | U | | 1 |
| 10. | Male sterile line (Aline) is called as \_\_\_\_\_\_\_\_. | | CO4 | R | | 1 |
| 11. | The recommended physical purity percentage of paddy is \_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 12. | Fertilized mature ovule is called as \_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 13. | Isolation distance is necessary to maintain the \_\_\_\_\_\_\_\_ purity | | CO1 | R | | 1 |
| 14. | Progeny of Breeder seed is \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 15. | Physiological maturation symptom for tomato \_\_\_\_\_\_\_\_. | | CO2 | C | | 1 |
| 16. | Which tag colour was prescribed for certified seed? | | CO2 | A | | 1 |
| 17. | Seed control order was started during the year \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 18. | Seed Act was started during the year \_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 19. | The fungal spores established over the seed coat is known as \_\_\_\_\_\_\_\_. | | CO1 | U | | 1 |
| 20. | \_\_\_\_\_\_\_\_\_ is the resting stage (or) survival mechanism of the seed. | | CO4 | C | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Explain the different stages of field inspection. | | CO2 | | U | 5 |
| 22. | Differentiate the seed production and grain production. | | CO1 | | A | 5 |
| 23. | Write the duties and responsibilities of seed inspector prescribed in seed act 1966. | | CO2 | | E | 5 |
| 24. | Write about various seed treatments. | | CO5 | | A | 5 |
| 25. | Write about the genetically modified crops. | | CO5 | | E | 5 |
| 26. | Write about the generation system of seed multiplication. | | CO4 | | A | 5 |
| 27. | Differentiate the seed and grain. | | CO1 | | R | 5 |
| 28. | Write the agronomic principles of seed production. | | CO1 | | R | 5 |
| 29. | Write about the double counting & liable for rejection report in seed certification. | | CO1 | | E | 5 |
| 30. | Write about the terminator technology. | | CO4 | | R | 5 |
| 31. | Write about organic seed production. | | CO4 | | U | 5 |
| 32. | Write about seed drying. | | CO5 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | | Briefly explain seed marketing. | CO6 | | An | 15 |
| 34. | | Briefly explain seed production techniques in rice. | CO3 | | A | 15 |
| 35. | | Write the deterioration causes for varieties. | CO1 | | A | 15 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the importance of quality seed in agriculture production. |
| CO2 | Distinguish types of seeds and know seed certification process |
| CO3 | Apply seed production techniques in cereals, pulses, and oilseeds, vegetable and forage seeds |
| CO4 | Describe seed structure and morphology, physical characteristics of seed |
| CO5 | Conduct varietal identification, seed quality assessments tests and seed treatments |
| CO6 | Remember the concepts in seed storage and seed marketing |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 22 | 1 | 20 |  | 5 | - | 48 |
| CO2 | 1 | 7 | 2 |  | 5 | 1 | 16 |
| CO3 | 4 | 4 | 16 |  | - | - | 24 |
| CO4 | 6 | 5 |  | 5 |  | 1 | 17 |
| CO5 | 5 |  | - | 5 | 5 | - | 15 |
| CO6 |  |  | - | 15 | - | - | 15 |
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| **Course Code** | **20AG2014** | **Duration** | **3hrs** |
| **Course Name** | **MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Define Liebig’s Law of Minimum. | | CO2 | R | | 1 |
| 2. | Identify the deficient nutrient for the given symptoms.  a. Hen and chick berries in grapes b. Reddening in cotton. | | CO5 | R | | 1 |
| 3. | List out 3 phosphorus containing fertilizers with nutrient composition. | | CO1 | R | | 1 |
| 4. | Name the extractant used in the estimation of available K. | | CO4 | U | | 1 |
| 5. | Define nano fertilizers. | | CO1 | R | | 1 |
| 6. | Name three biofertilizers used for solubilizing and mobilizing phosphorus. | | CO1 | U | | 1 |
| 7. | In which form is phosphorus taken up by the plants? | | CO5 | R | | 1 |
| 8. | Identify the form in which calcium and magnesium are taken up by the plants. | | CO5 | R | | 1 |
| 9. | Identify the bacteria involved in the conversion of NH4+ to NO2-  and NO2- to NO3-. | | CO2 | R | | 1 |
| 10. | Indicate in which form is P present in acid soils. | | CO2 | An | | 1 |
| 11. | Interpret the forms in which nitrogen is lost from the soil. | | CO2 | U | | 1 |
| 12. | Identify the nutrient whose deficiency causes the following deficiency symptoms.  a. Tip drying and marginal scorching of leaves.  b. Whiptail of cauliflower. | | CO5 | R | | 1 |
| 13. | Identify the biuret content above which a foliar application may cause injury to plants. | | CO1 | R | | 1 |
| 14. | List out the different methods of localized placement of fertilizer application. | | CO6 | R | | 1 |
| 15. | State the expansion of DSSIFER. | | CO4 | U | | 1 |
| 16. | Identify three slow release N fertilizers. | | CO1 | U | | 1 |
| 17. | Differentiate Deductive and Inductive approaches of fertilizer recommendation. | | CO4 | An | | 1 |
| 18. | Infer the optimum C:P ratio for plant growth. | | CO2 | R | | 1 |
| 19. | List 3 secondary fertilizers. | | CO1 | R | | 1 |
| 20. | Who is responsible for the enforcement of F.C.O in India? | | CO1 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Discuss the role of organic manures in soil fertility management and explain the preparation of bulky organic manures briefly. | | CO1 | | U | 5 |
| 22. | Describe the various methods of soil fertility evaluation through plant analysis. | | CO4 | | U | 5 |
| 23. | Explain the importance of biofertilizers and give its classification. | | CO1 | | An | 5 |
| 24. | Explain the features of Fertilizer Control Order and fertilizer storage. | | CO1 | | U | 5 |
| 25. | Discuss the different mechanisms of nutrient transport to plants | | CO2 | | U | 5 |
| 26. | Describe the functions and deficiency symptoms of any four micronutrients. | | CO5 | | U | 5 |
| 27. | Classify the essential nutrients and state the criteria of essentiality. | | CO2 | | An | 5 |
| 28. | Compare the properties of nano fertilizers with conventional fertilizers and its importance. | | CO1 | | E | 5 |
| 29. | Explain the various methods of application of solid fertilizers. | | CO6 | | U | 5 |
| 30. | Explain the various classes of phosphorus fertilizers based on its composition and properties | | CO1 | | U | 5 |
| 31. | Write short notes on the various fertilizer recommendation approaches followed in our country. | | CO3 | | A | 5 |
| 32. | Appraise the importance of remote sensing, precision farming and advanced techniques in fertilizer recommendation and application. | | CO3 | | E | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Analyze and correlate the various forms and transformations of phosphorus in soil to its availability to plants. | CO2 | | An | 7 |
|  | b. | Appraise Integrated Nutrient Management as an efficient way to sustain the health of soils. | CO3 | | E | 8 |
|  |  |  |  | |  |  |
| 34. | a. | Classify the nitrogenous fertilizers based on its composition and properties. | CO1 | | An | 7 |
|  | b. | Explain the chemistry of soil nitrogen with a neat N cycle. | CO2 | | U | 8 |
|  |  |  |  | |  |  |
| 35. | a. | Explain the functions and deficiency symptoms of macronutrients in plants | CO5 | | U | 7 |
|  | b. | Propose few techniques to enhance the efficiency of macronutrients. | CO2 | | C | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the properties of manures, fertilizers and soil amendments. |
| CO2 | Summarize the concepts of soil fertility and plant nutrition and chemistry of nutrients in soil. |
| CO3 | Demonstrate Integrated Nutrient Management and fertilizer recommendation practices. |
| CO4 | Evaluate the fertility of soil. |
| CO5 | Analyze the plant nutrient content. |
| CO6 | Recommend fertilizer dosage for different soil types. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | 17 |  | 12 | 5 |  | 39 |
| CO2 | 3 | 14 |  | 13 |  | 8 | 38 |
| CO3 |  |  | 5 |  | 13 |  | 18 |
| CO4 |  | 7 |  | 1 |  |  | 8 |
| CO5 | 4 | 12 |  |  |  |  | 16 |
| CO6 | 1 | 5 |  |  |  |  | 6 |
|  | 13 | 55 | 5 | 26 | 18 | 8 | **125** |

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| **Course Code** | **20AT2006** | **Duration** | **3hrs** |
| **Course Name** | **INTRODUCTORY SOIL AND WATER CONSERVATION ENGINEERING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Mention two major process during soil erosion. | | CO1 | U | | 1 |
| 2. | What is slope and length factor? | | CO1 | U | | 1 |
| 3. | Define stream bank erosion. | | CO2 | U | | 1 |
| 4. | Define on gully erosion. | | CO2 | U | | 1 |
| 5. | What do meant by sheet erosion? | | CO2 | U | | 1 |
| 6. | Define erodibility. | | CO1 | U | | 1 |
| 7. | Write shortly on Terminal velocity. | | CO3 | U | | 1 |
| 8. | Name any one of the soil and water conservation institute. | | CO 3 | An | | 1 |
| 9. | Define run-off. | | CO4 | An | | 1 |
| 10. | Contour line with “V” shaped with convexity towards higher ground surface indicate \_\_\_\_\_\_\_\_\_\_. | | CO4 | U | | 1 |
| 11. | Write on two our run-off measuring devices. | | CO4 | R | | 1 |
| 12. | Mention on various methods of measuring soil erodibility. | | CO2 | U | | 1 |
| 13. | What are the various shapes used in grassed waterway? | | CO4 | U | | 1 |
| 14. | \_\_\_\_\_\_\_\_\_\_ soils are not suitable for bund construction. | | CO5 | U | | 1 |
| 15. | What are the factors affecting wind erosion? | | CO5 | An | | 1 |
| 16. | Define contour bund. | | CO6 | U | | 1 |
| 17. | Define table top bench terrace. | | CO4 | U | | 1 |
| 18. | Define shelterbelt. | | CO6 | U | | 1 |
| 19. | What are factors affecting water erosion? | | CO2 | E | | 1 |
| 20. | Define windbreak. | | CO6 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Enumerate the applications and limitations of USLE. | | CO 3 | | U | 5 |
| 22. | Compare the mechanical measures and agronomic measures to control water erosion. | | CO1 | | A | 5 |
| 23. | Explain the method of EI30 and KE>25 index of estimation of rainfall erosivity. | | CO2 | | U | 5 |
| 24. | Explain in detail the classification of gullies. | | CO2 | | An | 5 |
| 25. | Explain in details the land capability classification. | | CO 4 | | U |  |
| 26. | Write in detail the types of water erosion. | | CO 5 | | U | 5 |
| 27. | Explain in details the types of water harvesting and their importance. | | CO 4 | | U | 5 |
| 28. | Write short notes on methods of contouring. | | CO 4 | | A | 5 |
| 29. | Differentiate between the contour bund and graded bund. | | CO5 | | U | 5 |
| 30. | Write short notes on Modified Universal Soil Loss Equation. | | CO2 | | E | 5 |
| 31. | Describe the mechanics of wind erosion. | | CO5 | | U | 5 |
| 32. | Write on the various types of terracing. | | CO4 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain in detail (i) Specification of bund.  (ii) Construction of bund. | CO2 | | A | 8 |
|  | b. | Discuss in detail the causes and factors affecting soil erosion. | CO1 | | E | 7 |
| 34. | a. | Explain in detail the factors associated with Universal Soil Loss Equation. | CO3 | | An | 8 |
|  | b. | Explain in detail the gully control measures and their classification. | CO | | A | 7 |
| 35. | a. | Give account on the various water harvesting techniques. | CO | | E | 8 |
|  | b. | Discuss in detail the designing of grassed waterways. | CO | | A | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | The students will attain the basic concepts of soil and water conservation. |
| CO2 | To adopt the gully erosion control measures. |
| CO3 | To measure the soil loss using different techniques. |
| CO4 | Explain the water harvesting techniques. |
| CO5 | Understand the mechanics of wind erosion. |
| CO6 | Adapt the different control measures of wind erosion. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 2 | 5 | - | 7 | - | 15 |
| CO2 | - | 9 | 8 | 5 | 6 | - | 28 |
| CO3 | 1 | 6 | - | 8 | - | - | 15 |
| CO4 | 1 | 18 | 12 | 1 | - | - | 32 |
| CO5 | - | 16 | - | 1 | 8 | - | 25 |
| CO6 | - | 3 | 7 | - | - | - | 10 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG1001** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF AGRONOMY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | A primitive from of agriculture in which people cut down a part of the forest, burnt the underneath growth and cultivated crops is known as \_\_\_\_\_\_\_\_\_\_\_ cultivation. | | CO1 | U | | 1 |
| 2. | Great increase in the production of food grains in India during 1960’s and 70’ s is known as \_\_\_\_\_\_\_\_\_\_\_ revolution. | | CO1 | R | | 1 |
| 3. | Though 60 elements are present in the plant body, only \_\_\_\_\_\_\_\_\_\_\_ numbers of elements are essential for plant growth. | | CO3 | U | | 1 |
| 4. | About \_\_\_\_\_\_\_\_\_\_\_% of people rely directly on agriculture as a livelihood in India. | | CO1 | U | | 1 |
| 5. | Seasonal crops grown on a vast scale under field condition is known as \_\_\_\_\_\_\_\_\_\_\_ crops. | | CO2 | A | | 1 |
| 6. | \_\_\_\_\_\_\_\_\_\_\_ is the worst weed of the world. | | CO5 | R | | 1 |
| 7. | \_\_\_\_\_\_\_\_\_\_\_ period of weed competition is defined as the shortest time span during the crop growth when weeding results in highest economic returns. | | CO3 | U | | 1 |
| 8. | 2,4-D is a translocated \_\_\_\_\_\_\_\_\_\_\_ herbicides commonly used in paddy. | | CO3 | R | | 1 |
| 9. | Plant growth in which the main stem continues to grow indefinitely without being limited by a terminal inflorescence or other reproductive structure is known as \_\_\_\_\_\_\_\_\_\_\_ growth. | | CO3 | U | | 1 |
| 10. | The increase of dry weight by a unit area of the crop in a unit time is known as \_\_\_\_\_\_\_\_\_\_\_ growth rate. | | CO3 | A | | 1 |
| 11. | \_\_\_\_\_\_\_\_\_\_\_ part of sunlight is mainly utilized in photosynthesis. | | CO4 | U | | 1 |
| 12. | As a general rule-of-thumb, for every tonne of carbon in soil organic matter, about \_\_\_\_\_\_\_\_\_\_\_kg of nitrogen becomes available to plants as the organic matter is broken down. | | CO4 | R | | 1 |
| 13. | \_\_\_\_\_\_\_\_\_\_\_ literally means 'a form denoting an idea”. | | CO2 | R | | 1 |
| 14. | The crop which is planted at its optimum sole crop population in an intercrop situation is known as \_\_\_\_\_\_\_\_\_\_\_ crop. | | CO5 | R | | 1 |
| 15. | Tea is a crop adapted to \_\_\_\_\_\_\_\_\_\_\_ soil based on the pH of the soil. | | CO4 | An | | 1 |
| 16. | The crop which is cultivated in highest area in India is \_\_\_\_\_\_\_\_\_\_\_. | | CO6 | R | | 1 |
| 17. | Crop is to be harvested at \_\_\_\_\_\_\_\_\_\_\_ maturity when field is to be vacated for the sowing of next crop otherwise it is advisable to follow harvest maturity. | | CO6 | An | | 1 |
| 18. | Milling yields on an average \_\_\_\_\_\_\_\_\_\_\_ % rice. | | CO6 | A | | 1 |
| 19. | Moisture content of grains for safe storage of Wheat, barley, sorghum, millets and pulses is \_\_\_\_\_\_\_\_\_\_\_ %. | | CO6 | U | | 1 |
| 20. | The idea behind minimum \_\_\_\_\_\_\_\_\_\_\_price is to give guaranteed price and assured market to the farmers and protect them from the price fluctuations and market imperfections. | | CO6 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | List out the types of tillage with their sub-classes. | | CO3 | | C | 5 |
| 22. | Write a short note on different methods of sowing seeds. | | CO1 | | E | 5 |
| 23. | Differentiate macro and micronutrients and list out these elements. | | CO3 | | R | 5 |
| 24. | Differentiate bulky and concentrated organic manures. Give two examples each for both type of manures. | | CO3 | | U | 5 |
| 25. | Classify crops according to growing seasons and ontogeny, define them and give two examples each. | | CO2 | | An | 5 |
| 26. | Give a brief account of the classification of weeds based on morphological characters. | | CO5 | | E | 5 |
| 27. | Give a short note on various cultural methods of weed management. | | CO6 | | An | 5 |
| 28. | Define crop rotation. Explain the principles of crop rotation. | | CO6 | | U | 5 |
| 29. | Define allelopathy, its types and kinds of allelochemicals released by plants. | | CO3 | | An | 5 |
| 30. | Define growth. List out the genetic factors affecting plant growth. | | CO3 | | C | 5 |
| 31. | Explain the various harvesting techniques of rice. | | CO6 | | A | 5 |
| 32. | Define crop ideotype. List out the types of crop ideotypes. | | CO2 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Define fertilizers. Based on the number and combination of nutrients classify fertilizers, define them and give two examples for each group. | CO3 | | A | 7 |
|  | b. | Give a brief note on different biofertilizers used in agriculture. | CO3 | | An | 8 |
| 34. | a. | Define seed. Give brief explanation on different kinds of seeds. | CO2 | | C | 7 |
|  | b. | Define crop geometry. List out the different crop geometries and the merits and demerits of each type. | CO2 | | E | 8 |
| 35. | a. | Define multiple cropping. Explain the different forms of multiple cropping. | CO5 | | R | 7 |
|  | b. | Give a brief explanation on value added products of rice. | CO6 | | U | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the kharif crops and crop production technology for kharif crops. |
| CO2 | Gain knowledge on geographical distribution of kharif crops uses and products. |
| CO3 | Recall the morphological features and crop production requirements for kharif season crops. |
| CO4 | Remember soil and climatic requirements of different kharif crop varieties. |
| CO5 | Acquire the knowledge on crop management practices for kharif season. |
| CO6 | Apply the acquired knowledge to guide the farmers for cultivating kharif crops. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 2 | 0 | 0 | 5 | 0 | 8 |
| CO2 | 1 | 5 | 1 | 5 | 8 | 7 | 27 |
| CO3 | 6 | 8 | 8 | 13 | 0 | 10 | 45 |
| CO4 | 1 | 1 | 0 | 1 | 0 | 0 | 3 |
| CO5 | 9 | 0 | 0 | 0 | 5 | 0 | 14 |
| CO6 | 1 | 15 | 6 | 6 | 0 | 0 | 28 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG1002** | **Duration** | **3hrs** |
| **Course Name** | **AGRICULTURAL HERITAGE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | \_\_\_\_\_\_\_\_\_ type of agriculture has been practiced in India for several hundreds of years and still prevails in a larger part of India. | | CO5 | A | 1 |
| 2. | Where is IBPGR and ICRISAT situated? | | CO1 | R | 1 |
| 3. | The artificial reservoirs of Indus valley civilization is called as \_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 4. | Define Agricultural Heritage. | | CO1 | AN | 1 |
| 5. | Define ITK. | | CO4 | E | 1 |
| 6. | As per planning commission, India is classified in \_\_\_\_\_\_\_\_\_agroclimatic zones. | | CO1 | E | 1 |
| 7. | ICAR - Central Institute of Brackish water Aquaculture is located at\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 8. | Pradhanmantri Gram Sinchai Yojana is a scheme which provides to improve\_\_\_\_\_\_\_\_\_. | | CO2 | R | 1 |
| 9. | What is lapse rate? | | CO2 | R | 1 |
| 10. | Expand ICAR. | | CO3 | U | 1 |
| 11. | Expand CIMMYT. | | CO2 | U | 1 |
| 12. | Write four agricultural season of India. | | CO4 | A | 1 |
| 13. | The Indus Valley is the home of \_\_\_\_\_\_\_\_\_\_ crop cultivation. | | CO1 | U | 1 |
| 14. | Introduced semi-dwarf rice varieties \_\_\_\_\_\_\_\_\_ respectively is formed as base for green revolution. | | CO2 | R | 1 |
| 15. | The farmers holding the land less than one hectare is comes under\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 16. | Expand IRRI and CAZRI. | | CO3 | U | 1 |
| 17. | Write the future prospects of Indian Agriculture. | | CO2 | A | 1 |
| 18. | Write any two National Research Centres in India. | | CO3 | A | 1 |
| 19. | Expand GDP and GNI. | | CO3 | U | 1 |
| 20. | Define Alfisols. | | CO5 | U | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | Write a short note on agricultural research activities in the British era for our country. | | CO1 | R | 5 |
| 22. | Discuss about history of irrigation development in India. | | CO1 | R | 5 |
| 23. | Define (i) History (ii) Heritage (iii) Astronomy (iv) Humus and (v) Green Revolution. | | CO1 | A | 5 |
| 24. | Mention any 10 national research institutions. | | CO1 | R | 5 |
| 25. | Discuss about Agriculture from Sangam literature. | | CO1 | U | 5 |
| 26. | Write brief notes on agro climatic zones in Tamil Nadu? | | CO4 | A | 5 |
| 27. | Discuss about theoretical basis of weather forecasting from ancient literatures. | | CO3 | A | 5 |
| 28. | Write about importance of Agricultural Heritage. | | CO1 | U | 5 |
| 29. | Write about major soils of Tamil Nadu. | | CO1 | U | 5 |
| 30. | Discuss about roles and importance of ITK. | | CO4 | A | 5 |
| 31. | Write the importance of agriculture. | | CO1 | U | 5 |
| 32. | Mention the relationship between main branches of agriculture. | | CO1 | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Explain ITK in agriculture. | CO4 | A | 8 |
|  | b. | Write in detail about soil classification. | CO2 | R | 7 |
| 34. | a. | Write down the agricultural resources available in India. | CO1 | A | 6 |
|  | b. | Elaborately discuss the relevance of heritage to present day agriculture. | CO1 | E | 7 |
| 35. | a. | Write short notes on special category of crops | CO2 | A | 8 |
|  | b. | Explain farm mechanization. | CO6 | A | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand agricultural heritage of India, agricultural resources and development of Indian agriculture from ancient to modern era | | | | | | | |
| CO2 | Compare indigenous traditional knowledge in agriculture and crop voyage in India and the world | | | | | | | |
| CO3 | Describe gender perspective, tasks of farm women, women empowerment and self-help groups | | | | | | | |
| CO4 | Apply Indigenous Traditional Knowledge (ITK) in modern agricultural practices | | | | | | | |
| CO5 | Visualize transition of agriculture from past to present | | | | | | | |
| CO6 | Acquire knowledge on gender issues in agriculture for women empowerment and implement women-friendly agricultural technologies | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 24 | 21 | 20 | 1 | 1 |  | 67 |
| CO2 | | 3 | 1 | 16 |  |  |  | 20 |
| CO3 | |  | 3 | 6 |  |  |  | 9 |
| CO4 | |  |  | 26 |  | 1 |  | 27 |
| CO5 | |  | 1 | 1 |  |  |  | 2 |
| CO6 | |  |  |  |  |  |  | 0 |
|  | | | | | | | | **125** |

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| **Course Code** | **21AG1003** | **Duration** | **3hrs** |
| **Course Name** | **INTRODUCTION TO FORESTRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Botanical name of pungam is \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 2. | Define scrub? | | CO5 | R | | 1 |
| 3. | Name any two fruit trees species. | | CO1 | R | | 1 |
| 4. | The suitable age for practicing of coppicing is \_\_\_\_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 5. | Mention the botanical name of tamarind. | | CO2 | R | | 1 |
| 6. | Name any two woody trees species. | | CO3 | R | | 1 |
| 7. | What is the total percentage of low dense forest in India? | | CO3 | U | | 1 |
| 8. | Neem belongs to the family of \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 9. | What is the total accounts for scrub forest in India? | | CO1 | R | | 1 |
| 10. | Pollarding is practiced in \_\_\_\_\_\_\_\_\_\_\_ crop. | | CO4 | U | | 1 |
| 11. | How many tropical forests are there in India? | | CO2 | U | | 1 |
| 12. | Name any two fodder tree species. | | CO4 | R | | 1 |
| 13. | How many subtropical forests are there in India? | | CO1 | R | | 1 |
| 14. | Name any two shelterbelt tree species. | | CO4 | U | | 1 |
| 15. | Teak belong to the family. | | CO3 | U | | 1 |
| 16. | What is an example of deciduous forest trees? | | CO5 | R | | 1 |
| 17. | Name any two live fence tree species. | | CO2 | U | | 1 |
| 18. | Mention one medicinal forest tree. | | CO3 | R | | 1 |
| 19. | The queen of forest tree is \_\_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 20. | How many temperate forests are there in India? | | CO1 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Differentiate between the seedling coppice and stool coppice. | | CO1 | | R | 5 |
| 22. | Discuss on grafting and mention the types. | | CO2 | | U | 5 |
| 23. | Write short note on alley cropping. | | CO3 | | E | 5 |
| 24. | Discuss the multispecies cropping system. | | CO4 | | U | 5 |
| 25. | Differentiate between the climate and microclimate. | | CO5 | | E | 5 |
| 26. | Define budding and mention the types. | | CO6 | | U | 5 |
| 27. | Explain the pollarding. | | CO1 | | E | 5 |
| 28. | Discuss the detailed note on shifting cultivation. | | CO2 | | U | 5 |
| 29. | Differentiate between the silvi-pastoral and silvi-olericulture. | | CO3 | | U | 5 |
| 30. | Explain the cutting. | | CO4 | | U | 5 |
| 31. | Differentiate between the horti-pasture and boundary plantation. | | CO5 | | E | 5 |
| 32. | What is layering and mention the types. | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss in detail vegetative propagation and explain the advantages and disadvantages? | CO2 | | R | 8 |
|  | b. | Explain the scope and importance of forestry. | CO5 | | R | 7 |
| 34. | a. | Give a detailed note on natural and artificial regeneration. | CO4 | | U | 8 |
|  | b. | Discuss a detailed note on limitation of forestry. | CO4 | | E | 7 |
| 35. | a. | Write a detailed note on nitrogen cycle and phosphorous cycle? | CO6 | | U | 8 |
|  | b. | Give a detailed note on types of forest in India. | CO3 | | E | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the forest eco system and forest regeneration. |
| CO2 | Remember the concepts of agroforestry practiced in various agro ecosystems. |
| CO3 | Apply the knowledge for developing agro forestry, wind breaks, shelter belts, silviculture and social forestry. |
| CO4 | Recall the multipurpose trees in agroforestry systems. |
| CO5 | Analyze the impact of nitrogen fixation, carbon sequestration and develop strategies for climate mitigation. |
| CO6 | Explain the beneficial effects of agro forestry in relation to nitrogen fixation, soil conservation, litter dynamics and nutrient cycles. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 9 | 1 |  |  | 5 |  | **15** |
| CO2 | 10 | 12 |  |  | 0 |  | **22** |
| CO3 | 3 | 7 |  |  | 12 |  | **22** |
| CO4 | 1 | 20 |  |  | 7 |  | **28** |
| CO5 | 9 | 0 |  |  | 10 |  | **19** |
| CO6 | 0 | 19 |  |  | 0 |  | **19** |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| --- | --- | --- | --- |
| **Course Code** | **21AG1051** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF AGRICULTURAL ECONOMICS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |  |
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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Who is called as father of economics? | | | CO1 | U | | 1 |
| 2. | What is the other name for price theory? | | | CO1 | R | | 1 |
| 3. | Define “Demand”. | | | CO1 | R | | 1 |
| 4. | Which methodology of economics starts from general to particular | | | CO2 | R | | 1 |
| 5. | Expand GDP. | | | CO2 | U | | 1 |
| 6. | Define Macroeconomics. | | | CO2 | R | | 1 |
| 7. | Which type of utility created during storage of a commodity------------ | | | CO3 | U | | 1 |
| 8. | A monopoly is a market with------seller. | | | CO3 | R | | 1 |
| 9. | Expand RBI. | | | CO3 | U | | 1 |
| 10. | Give one example for institutional sources of credit. | | | CO4 | U | | 1 |
| 11. | Demand curve is -----------------sloping. | | | CO4 | U | | 1 |
| 12. | Reward paid for enterprise is called as………… | | | CO4 | R | | 1 |
| 13. | Direct Tax Vs Indirect Tax : How do they differ? | | | CO5 | R | | 1 |
| 14. | What is Inflation? | | | CO5 | R | | 1 |
| 15. | An inferior good is one, the consumption of which \_\_\_\_\_\_\_\_ as income increases. | | | CO6 | U | | 1 |
| 16. | Define tax. | | | CO6 | R | | 1 |
| 17. | Indifference curve intersect with each other (True/False). | | | CO6 | U | | 1 |
| 18. | How many stages are there in a production function? | | | CO1 | R | | 1 |
| 19. | GDP plus net factor income from abroad is called……….. | | | CO2 | U | | 1 |
| 20. | What is “Public Finance”? | | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | State Law of Demand and explain about the factors affecting demand. | | | CO1 | | An | 5 |
| 22. | Explain about Indifference curve and its properties. | | | CO2 | | U | 5 |
| 23. | Illustrate the stages of production function/input-output relationship. | | | CO3 | | An | 5 |
| 24. | Explain about 3R’s and 5P’s. | | | CO4 | | U | 5 |
| 25. | Define Tax and explain about different types of Tax. | | | CO5 | | An | 5 |
| 26. | Write short notes on barter system of exchange and its problems. | | | CO6 | | U | 5 |
| 27. | Differentiate capitalistic and socialistic economy. | | | CO1 | | An | 5 |
| 28. | What is Inflation? Explain the types of Inflation. | | | CO2 | | U | 5 |
| 29. | Give a detailed note on perfect competition and imperfect markets. | | | CO3 | | An | 5 |
| 30. | What is meant by agricultural finance and give a brief note on institutional sources of credit? | | | CO4 | | U | 5 |
| 31. | Explain about the different types of taxes. | | | CO5 | | An | 5 |
| 32. | Explain the methods of calculating national income. | | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | What is National Income? What are different components of National Income? | CO1 | | U | 7.5 |
|  | | b. | What are the functions of Money? Explain the different types of Money. | CO1 | | R | 7.5 |
|  | |  |  |  | |  |  |
| 34. | | a. | What is elasticity of demand? Briefly narrate the importance and measurement of elasticity of demand. | CO3 | | An | 7.5 |
|  | | b. | Explain the law of diminishing marginal utility with its assumptions and limitations. | CO2 | | U | 7.5 |
|  | |  |  |  | |  |  |
| 35. | | a. | Explain about theories of population. | CO3 | | R | 7.5 |
|  | | b. | List out different types of cost and write short notes on it. | CO3 | | U | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the principle and theories, and its role in planning for economic development of the country |
| CO2 | Remember consumer behaviour - utility maximization problem and demand theory |
| CO3 | Explain fundamental concepts of agricultural economics, theory of production, theory of cost and output determination across market structures |
| CO4 | Evaluate different agricultural finance systems and their role as credit agencies |
| CO5 | Enumerate and discuss different taxes applicable to agriculture |
| CO6 | Analise theory of general equilibrium and welfare economics |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 4 | 1 | - | 2 | - | - | 29.0 |
| CO2 | 2 | 5 | - | - | - | - | 21.5 |
| CO3 | 2 | 3 | - | 3 | - | - | 35.5 |
| CO4 | 1 | 5 |  | - | - | - | 13.0 |
| CO5 | 2 | - | - | 2 | - | - | 13.0 |
| CO6 | 1 | 4 | - | - | - | - | 13.0 |
|  | | | | | | | **125** |

**Graphical user interface, application

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| --- | --- | --- | --- |
| **Course Code** | **21AG1101** | **Duration** | **3hrs** |
| **Course Name** | **COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | What is “A way of feeling or acting towards a person, thing or situation (Attitude, Decision Making, Goal Setting). | | CO4 | R | 1 |
| 2. | What is the process of deciding what you want to accomplish and devising a plan to achieve the result you desire? (Attitude, Decision Making, Goal Setting). | | CO4 | R | 1 |
| 3. | What is called the process whereby one individual influences other group members towards the attainment of defined group or organizational goals? (Attitude, Leadership, Goal Setting). | | CO5 | R | 1 |
| 4. | What is the leadership style that lacks direct supervision of employees and fails to provide regular feedback to those under his supervision? (Lassiez Faire, Autocratic, Democratic). | | CO 5 | R | 1 |
| 5. | Name the leadership style allows managers to make decisions alone without the input of others (Lassiez Faire, Autocratic, Democratic). | | CO5 | R | 1 |
| 6. | The leadership style that values the input of team members and peers (Transactional, Autocratic, Democratic). | | CO 5 | R | 1 |
| 7. | The leadership style where the team members receive certain tasks to perform and provide rewards or punishments to team members based on performance results. (Lassiez Faire, Autocratic, Transformational). | | CO5 | R | 1 |
| 8. | What is called the feeling of being overwhelmed or unable to cope with mental or emotional pressure (Excitement, Stress, and Lethargy) | | CO 5 | R | 1 |
| 9. | The form of stress having a beneficial effect on health, motivation, performance and well-being. | | CO 5 | R | 1 |
| 10. | The type of stress we are referring to when it creates negative implications. | | CO5 | R | 1 |
| 11. | What is the mental process resulting in the selection of a course of action among several alternatives (Attitude, Decision Making, Goal Setting). | | CO 5 | R | 1 |
| 12. | Name a method of note taking. | | CO 3 | R | 1 |
| 13. | What is called the study of communication through space around us including the distance maintained between people? | | CO5 | R | 1 |
| 14. | Name the two forms of verbal communication. | | CO3 | R | 1 |
| 15. | Name the process of designing and delivering a message to an audience (Public speaking, Presentation, Summarizing). | | CO5 | R | 1 |
| 16. | Verbal communication always involve either spoken or written \_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | 1 |
| 17. | Mass communication involves a person sending messages to \_\_\_\_\_\_\_\_\_\_\_ number of receivers/audience. | | CO5 | R | 1 |
| 18. | What is the term used for a way of summarizing, in which the meaning of the original text is maintained. | | CO3 | R | 1 |
| 19. | What is Scanning? | | CO2 | R | 1 |
| 20. | What is Skimming? | | CO2 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | Discuss the factors affecting the formation of attitude. | | CO1 | A | 5 |
| 22. | Explain the SMART principle in Goal setting. | | CO2 | U | 5 |
| 23. | Identify any 5 causes of stress. | | CO3 | A | 5 |
| 24. | Explain the different note taking methods. | | CO4 | U | 5 |
| 25. | What is the difference between laissez-Faire leader and Democratic leader? | | CO1 | A | 5 |
| 26. | What is Communication? Describe the steps in communication process. | | CO5 | A | 5 |
| 27. | Explain in brief about non-verbal communication. | | CO6 | U | 5 |
| 28. | Explain the methods used for reading scientific and technical articles (ERRQ, SQ3R). | | CO1 | A | 5 |
| 29. | Write about the following reading strategies: Skimming, Scanning, Extensive reading and Intensive reading. | | CO2 | U | 5 |
| 30. | Distinguish Verbal Vs Non-Verbal communication. | | CO3 | A | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Define Leadership. Explain about various types of leadership styles. | CO5 | A | 8 |
|  | b. | Write any 10 trait of a good leader. | CO5 | R | 7 |
|  |  |  |  |  |  |
| 34. | a. | What is stress? Name some of the symptoms of stress and how to manage stress? | CO2 | R | 8 |
|  | b. | Explain about the Decision making process. | CO2 | U | 7 |
|  |  |  |  |  |  |
| 35. | a. | What are the barriers to attitude change and methods to change attitude. | CO4 | R | 8 |
|  | b. | What is stress? What are the different types of stress (Distress and Eustress)? How does one respond to stress? | CO4 | R | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Apply indexing, footnote and bibliographic procedures |
| CO2 | Understand the comprehension of articles. |
| CO3 | Summarize and abstract. |
| CO4 | Participate and organize group discussions and seminars. |
| CO5 | Develop listening, writing and oral presentation skills. |
| CO6 | Maintain field diary and lab record. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  |  | 15 |  |  | 15 |
| CO2 | 10 | 18 |  |  |  |  | 28 |
| CO3 | 3 |  |  | 10 |  |  | 13 |
| CO4 | 17 | 5 |  |  |  |  | 22 |
| CO5 | 19 |  |  | 13 |  |  | 32 |
| CO6 |  | 5 |  |  |  |  | 5 |
|  | | | | | | | **115** |

**Graphical user interface, application

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| --- | --- | --- | --- |
| **Course Code** | **21AG1151** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF ENTOMOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Insects belong to Phylum \_\_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 2. | Peritrophic membrane is present in \_\_\_\_\_\_\_\_\_\_\_ gut. | | CO3 | U | | 1 |
| 3. | Asymmetrical mouthparts is present in \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | A | | 1 |
| 4. | The major component of insect cuticle is \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | An | | 1 |
| 5. | Pupa of mosquito is called as \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 6. | Termite possesses \_\_\_\_\_\_\_\_\_\_\_ type of antenna | | CO2 | R | | 1 |
| 7. | The ecosystem which has frequently occurring pest outbreaks is \_\_\_\_\_\_\_\_\_\_. | | CO5 | U | | 1 |
| 8. | Green lacewing fly lays \_\_\_\_\_\_\_\_\_\_\_ type of eggs | | CO3 | R | | 1 |
| 9. | The first Entomologist to the Government of India was \_\_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 10. | Insect haemolymph sugar is \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 11. | What do you mean by mechanical control of pest management? | | CO6 | An | | 1 |
| 12. | Meso and metathorax with wing are called as \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 13. | In Odonata, labium is greatly elongated, joined, and bears two hooks at apex is called \_\_\_\_\_\_\_\_\_\_\_. | | CO4 | A | | 1 |
| 14. | Johnston’s organ is present in \_\_\_\_\_\_\_\_\_\_\_ segment of antenna. | | CO2 | R | | 1 |
| 15. | Leaf hoppers belong to the family \_\_\_\_\_\_\_\_\_\_\_. | | CO4 | U | | 1 |
| 16. | Cornicles are present in \_\_\_\_\_\_\_\_\_\_\_ insect. | | CO2 | R | | 1 |
| 17. | Main organ of excretion and osmoregulation in insects is \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 18. | Destructive Insects and Pests Act was enforced in the year \_\_\_\_\_\_\_\_. | | CO6 | R | | 1 |
| 19. | Mosquito wriggler respire through \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | A | | 1 |
| 20. | Juvenile hormone is secreted by \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Differentiate Homopterans and Heteropterans. | | CO4 | | An | 5 |
| 22. | What are different types of mouth parts present in insects? Explain with examples | | CO3 | | E | 5 |
| 23. | Define moulting? Explain various steps involved in moulting | | CO3 | | C | 5 |
| 24. | Differentiate Anisoptera and Zygoptera | | CO4 | | An | 5 |
| 25. | Write about the respiration takes place in aquatic insects. | | CO3 | | U | 5 |
| 26. | List out various types of insect legs with examples? Explain modifications present in honeybee | | CO2 | | R | 5 |
| 27. | Elucidate various types of antenna present in insects with neat diagrams and examples. | | CO2 | | R | 5 |
| 28. | Define metamorphosis. Describe different types of metamorphosis with suitable examples | | CO3 | | R | 5 |
| 29. | Mention the important characters of insect order Diptera | | CO4 | | U | 5 |
| 30. | Differentiate male and female reproductive systems of insects with neat diagrams | | CO3 | | An | 5 |
| 31. | Differentiate Adephaga and Polyphaga | | CO4 | | An | 5 |
| 32. | Explain the wing coupling mechanism in insects | | CO3 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss briefly why insects are dominant in the Animal Kingdom | CO1 | | R | 7.5 |
|  | b. | Draw the structure of the alimentary canal and explain its regions | CO3 | | U | 7.5 |
| 34. | a. | Bring out the position of insects in the Animal Kingdom. Name all the Orders with examples in the Class Insecta | CO1 | | U | 7.5 |
|  | b. | What are the general characteristics of Coleoptera? Explain any four families of agricultural importance with examples | CO4 | | R | 7.5 |
| 35. | a. | Explain cultural methods of pest control. Narrate its advantages and disadvantages | CO6 | | U | 7.5 |
|  | b. | Define IPM- Explain the components, scope and limitations of IPM | CO6 | | R | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the origin and evolution of Insects. |
| CO2 | Understand the insect external body parts and their modifications. |
| CO3 | Understand the anatomy of internal organs and their functions. |
| CO4 | Remember the insect orders and families of agriculturally important pests. |
| CO5 | Analyze the factors influencing pest occurrence. |
| CO6 | Apply the fundamental knowledge on insects in their effective and integrated management strategies. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 9.5 | 7.5 | - | - | - | - | 17 |
| CO2 | 13 | 1 | 1 | - | - | - | 15 |
| CO3 | 9 | 19.5 | - | 6 | 5 | 5 | 44.5 |
| CO4 | 7.5 | 6 | 1 | 15 | - | - | 29.5 |
| CO5 | 1 | 1 | - | - | - | - | 2 |
| CO6 | 8.5 | 7.5 | - | 1 | - | - | 17 |
|  | | | | | | | **125** |

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| **Course Code** | **17AG1006** | **Duration :** | **3hrs** |
| **Course Name** | **CROP PHYSIOLOGY** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
|  | **PART-A(20X1=20 MARKS)** | | | |
| 1. | Water loss from the aerial parts of higher plants is mainly through\_\_\_\_\_\_\_\_. | CO1 | U | 1 |
| 2. | The upward movement of water from the root to aerial parts of the plant through the xylem is known as \_\_\_\_\_\_\_\_\_\_. | CO2 | R | 1 |
| 3. | The CO2 acceptor in C3 photosynthesis is \_\_\_\_\_\_\_\_\_\_. | CO4 | R | 1 |
| 4. | Attraction of similar molecules to each other is called \_\_\_\_\_\_\_\_\_\_. | CO2 | R | 1 |
| 5. | The site of Dark reaction of photosynthesis is \_\_\_\_\_\_\_\_\_\_. | CO4 | U | 1 |
| 6. | Latent heat of vaporization of water is \_\_\_\_\_\_\_\_\_. | CO1 | R | 1 |
| 7. | Example for stomatal closing type of antitranspirants \_\_\_\_\_\_\_\_\_. | CO3 | A | 1 |
| 8. | Unit of Specific Leaf Weight is \_\_\_\_\_\_\_\_\_\_\_. | CO5 | R | 1 |
| 9. | Explain the role of water in plants. | CO3 | U | 1 |
| 10. | Define transpiration and evaporation. | CO2 | U | 1 |
| 11. | NAR x LAI = | CO5 | U | 1 |
| 12. | Whiptail of cauliflower is due to the deficiency of \_\_\_\_\_\_\_\_\_. | CO3 | An | 1 |
| 13. | Father of Plant Physiology \_\_\_\_\_\_\_\_\_. | CO1 | R | 1 |
| 14. | Define photolysis of water. | CO4 | R | 1 |
| 15. | Define seed viability. | CO1 | U | 1 |
| 16. | The most abundant protein in the plant world is \_\_\_\_\_\_\_\_\_. | CO4 | R | 1 |
| 17. | Define photorespiration. | CO4 | U | 1 |
| 18. | Swelling of wooden doors during rainy season is due to\_\_\_\_\_\_\_\_\_\_\_. | CO3 | An | 1 |
| 19. | Growth curve is \_\_\_\_\_\_\_\_\_\_ in function. | CO5 | U | 1 |
| 20. | If endosmosis occurs when a cell is placed in a solution, then the solution is \_\_\_\_\_\_\_\_. | CO2 | U | 1 |

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|  | **PART B(10 X 5= 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Explain the difference between physiological maturity and harvestable maturity. | CO1 | An | 5 |
| 22. | Describe the morphological, physiological and biochemical changes during seed germination with suitable diagram. | CO5 | An | 5 |
| 23. | Explain Z-scheme of light reaction and differentiate cylic and non-cyclic phosphoryation. | CO4 | U | 5 |
| 24. | Explain the physiological functions and deficiencies of micro nutrients of Mn, Zn and B. | CO3 | U | 5 |
| 25. | Enumerate the physiological changes associated with post harvest of fruits. | CO6 | U | 5 |
| 26. | Explain the functions of macronutrients with suitable example. | CO3 | An | 5 |
| 27. | Explain the physiology of fruit ripening. | CO6 | U | 5 |
| 28. | List out the macro and micro nutrients. Write any five physiological disorders in crop plants. | CO3 | A | 5 |
| 29. | Describe the respiration cycle in plants with a diagram. | CO4 | U | 5 |
| 30. | Describe the C3 mechanism with diagram. | CO4 | An | 5 |
| 31. | Explain the ascent of sap mechanisms of xylem transport with diagram. | CO2 | U | 5 |
| 32. | Write in detail about measurement of growth and growth phases. | CO5 | An | 5 |

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|  | **PART C(2 X 15= 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Narrate the importance of transpiration and mechanisms of stomatal opening and closing with suitable diagram and list out the antitranspirants. | CO2 | An | 8 |
| b. | Apoplast and symplast pathways of water movement with diagram. | CO1 | U | 7 |
| 34. | a. | Elaborate the mechanism of nutrient uptake with diagram. | CO3 | U | 8 |
| b. | Explain the light reaction in photosynthesis process. | CO4 | R | 7 |
| 35. | a. | Narrate the role of post harvest technology in agriculture. | CO5 | A | 8 |
| b. | Detail the physiological growth parameters in crop productivity and the difference between climacteric and nonclimacteric fruits. | CO6 | E | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the physiology of plant tissues and cells. | | | | | | | |
| CO2 | Remember water movement in plant systems like diffusion and osmosis. | | | | | | | |
| CO3 | Apply the concept of water relations, mineral uptake in the field of agriculture. | | | | | | | |
| CO4 | Summarize the various physiological processes. | | | | | | | |
| CO5 | Measure and analyze the physiological parameters of crops. | | | | | | | |
| CO6 | Practice the use of growth regulators correctly to solve physiological problems. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 2 | 9 | - | 5 | - | - | 16 |
| CO2 | | 2 | 7 | - | 8 | - | - | 17 |
| CO3 | | - | 14 | 6 | 7 | - | - | 27 |
| CO4 | | 10 | 12 | - | 5 | - | - | 27 |
| CO5 | | 1 | 2 | 8 | 10 | - | - | 21 |
| CO6 | | - | 10 | - | - | 7 | - | 17 |
|  | | | | | | | | **125** |

**Graphical user interface, application

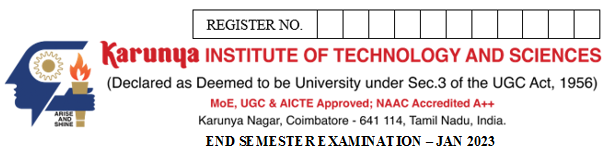
Description automatically generated with medium confidence**

| **Course Code** | **21AG1201** | **Duration** | **3hrs** |
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| **Course Name** | **FUNDAMENTALS OF GENETICS** | **Max. Marks** | **100** |

| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | A gel-like matrix lying just below the cell membrane, housing most of the cell organelles is called \_\_\_\_\_\_\_\_. | | | CO1 | U | | 1 |
| 2. | The term "Genetics" was coined by \_\_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 3. | Define “Phenotype”. | | | CO1 | R | | 1 |
| 4. | What is Allelomorph? | | | CO2 | R | | 1 |
| 5. | The theory of preformation believes that the organism is already preformed in the sperm or egg in a miniature form called as \_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 6. | What are multiple alleles? | | | CO2 | A | | 1 |
| 7. | What is meant by ‘Inversion’? | | | CO3 | A | | 1 |
| 8. | Gene interaction in which a dominant allele of one locus masks the expression of both the alleles of the other locus is called \_\_\_\_\_\_\_\_. | | | CO4 | A | | 1 |
| 9. | What is Chiasma? | | | CO1 | An | | 1 |
| 10. | Define “Mutagen”. | | | CO4 | R | | 1 |
| 11. | At which stage of meiosis I, crossing over takes place? | | | CO4 | A | | 1 |
| 12. | Name the cell organelle associated with protein synthesis. | | | CO6 | R | | 1 |
| 13. | Test cross ratio of a dihybrid cross is \_\_\_\_\_\_\_\_\_. | | | CO4 | R | | 1 |
| 14. | What is meant by translation? | | | CO5 | R | | 1 |
| 15. | Name the scientist who proposed the double helical structure DNA. | | | CO5 | R | | 1 |
| 16. | An enzyme that joins fragments in normal DNA replication is \_\_\_\_\_\_\_\_. | | | CO5 | U | | 1 |
| 17. | Define back cross. | | | CO1 | A | | 1 |
| 18. | Exchange of chromosomal segments between non-sister chromatids of homologous chromosomes is called \_\_\_\_\_\_\_\_\_\_? | | | CO3 | R | | 1 |
| 19. | Meiotic division is otherwise called \_\_\_\_\_\_\_\_\_\_ division. | | | CO6 | A | | 1 |
| 20. | Name the purines present in DNA. | | | CO5 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Examine the different types of epistatic gene interactions. | | | CO1 | | An | 5 |
| 22. | What is multiple allelism? Simplify the inheritance of blood groups. | | | CO3 | | An | 5 |
| 23. | Distinguish the difference between Monoploid, haploid and diploid. | | | CO3 | | An | 5 |
| 24. | Analyze the following in detail. i) sex influenced traits ii) sex limited traits iii) sex linked traits. | | | CO4 | | An | 5 |
| 25. | Interpret the structural changes in chromosomes with examples. | | | CO3 | | U | 5 |
| 26. | Compare incomplete dominance and codominance. | | | CO1 | | An | 5 |
| 27. | Simplify the characters of genetic code. | | | CO5 | | An | 5 |
| 28. | Examine criss-cross inheritance. | | | CO2 | | An | 5 |
| 29. | Summarize the different concepts of inheritance. | | | CO6 | | U | 5 |
| 30. | Organize the different types of sex determination. | | | CO2 | | A | 5 |
| 31. | Interpret polyploidy and their types. | | | CO2 | | U | 5 |
| 32. | Distinguish between “Quantitative trait” and “Qualitative trait”. | | | CO6 | | An | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Summarize the types of RNA with suitable illustrations. | CO5 | | U | 8 |
|  | | b. | Organize the flow of genetic information in the central dogma of life. | CO5 | | A | 7 |
| 34. | | a. | Simplify the stages of Meiosis with a neat diagram and its significance. | CO1 | | An | 8 |
|  | | b. | Examine cytoplasmic inheritance with examples. | CO6 | | An | 7 |
| 35. | | a. | Examine the nature, structure and replication of the genetic material. | CO5 | | An | 8 |
|  | | b. | Define mutation. Explain its different types. | CO4 | | U | 7 |

|  | **COURSE OUTCOMES** |
| --- | --- |
| CO1 | Solve problems on Mendelian genetics. |
| CO2 | Construct gene map using linkage. |
| CO3 | Identify the type of aberrations and its usage in agriculture. |
| CO4 | Understand inducing mutation by artificial methods. |
| CO5 | Explain the central dogma of life. |
| CO6 | Adopt the knowledge of cytoplasmic inheritance in plant breeding. |

| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
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| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 1 | 1 | 19 | - | - | 24 |
| CO2 | 1 | 5 | 6 | 5 | - | - | 17 |
| CO3 | 1 | 5 | 1 | 10 | - | - | 17 |
| CO4 | 2 | 7 | 2 | 5 | - | - | 16 |
| CO5 | 3 | 9 | 7 | 13 | - | - | 32 |
| CO6 | 1 | 5 | 1 | 12 | - | - | 19 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG1301** | **Duration :** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF SOIL SCIENCE** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
|  |  | **PART-A (20 X 1 =20 MARKS)** | | | |
| 1. | The distance travelled by water through soil column is called as ……… | | CO2 | R | 1 |
| 2. | Smallest volume of soil unit represents ……….. | | CO1 | R | 1 |
| 3. | Granular structure is ……………. | | CO3 | R | 1 |
| 4. | Consistency of wet soil is denoted by …………………. | | CO3 | R | 1 |
| 5. | What forms the skeleton of soil …………**.** | | CO1 | A | 1 |
| 6. | ……….. is an organic colloid | | CO5 | U | 1 |
| 7. | Base saturation percentage for a good agricultural soil should be ………… | | CO4 | E | 1 |
| 8. | Study of soil with respect to crop growth is called as …………. | | CO1 | R | 1 |
| 9. | The Soil reaction at pH is ………………. | | CO3 | An | 1 |
| 10. | The compound which is decomposed slowly in organic matter is ……………. | | CO5 | U | 1 |
| 11. | Soil organic matter is the Primary energy sources of …………. | | CO5 | U | 1 |
| 12. | Regolith may be defined as   1. Pedon b. Consoliadated bed rock   c. Solum d. Loose unconsolidated bed rock | | CO1 | R | 1 |
| 13. | Nitrification is the conversion of ……  a. Ammonium to nitrous oxide b. Ammonium to nitrate  c. Nitrate to ammonium d. none | | CO5 | An | 1 |
| 14. | The parent material transported by the action of wind is called ……….  a. Aeolian deposits b. Alluvium depsoits  c. Colluvium depsoits d. Lacustrine | | CO2 | R | 1 |
| 15. | What is the bulk density of the soil Sample?   1. 1.26 Mg m-3 b. 1.48 Mg m-3 c. 1.56 Mg m-3 d.1.85 Mg m-3 | | CO3 | R | 1 |
| 16. | An example of 1:1 clay mineral is \_\_\_\_\_\_\_\_\_\_\_   1. Kaolinite b. illite c. Chlorie and d. Montmorillinite | | CO3 | E | 1 |
| 17. | Exfoliation is also known as onion like weathering . True/ False | | CO3 | An | 1 |
| 18. | Soil organic matter plays a major role in aggregation formation. True/ False | | CO2 | An | 1 |
| 19. | Granite is calssified under basic igneous rocks. True/ False | | CO1 | R | 1 |
| 20. | Father of Soil Science is called Dockucheive. True/ False | | CO1 | R | 1 |

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|  |  | **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Discuss the role of soil organic matter on soil productivity. | | CO5 | U | 5 |
| 22. | Compare infiltration and percolation. | | CO2 | An | 5 |
| 23. | Write a note on CEC and AEC. | | CO4 | R | 5 |
| 24. | Explain properties of montomorillionite with schematic sketch. | | CO3 | R | 5 |
| 25. | Explain the types of soil structure and its significance. | | CO2 | R | 5 |
| 26. | Draw a typical soil profile showing the master horizons. Briefly discuss simonsons basic processes of soil formation. | | CO2 | R | 5 |
| 27. | Give a detailed sketch of chemical weathering process. | | CO1 | R | 5 |
| 28. | Explain the methods of soil moisture estimation. | | CO3 | R | 5 |
| 29. | Define weathering. Briefly explain the chemical agents of weathering. | | CO1 | R | 5 |
| 30. | Explain the ion exchange and its significance | | CO2 | U | 5 |
| 31. | Describe the beneficial and harmful roles of soil microbes. | | CO4 | U | 5 |
| 32. | Soil is a wonderful laboratory of microorganisms. Comment. | | CO4 | C | 5 |

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|  |  | | **PART C(2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | |
| 33. | a. | Narrate on the fractions of soil organic matter. | | CO1 | U | 8 |
| b. | Explain about the formation of humus. | | CO5 | U | 7 |
| 34. | a. | Briefly discuss the physical classification of soil water. | | CO3 | R | 8 |
| b. | Define soil colloids. List the types of soil colloids. | | CO4 | R | 7 |
| 35. | a. | Explain the significance of pH and buffering in soils. | | CO4 | An | 8 |
| b. | Write short notes on the factors affecting of soil temperature. | | CO4 | A | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the genesis, pedological and edaphological concepts of soil |
| CO2 | Remember different systems of soil classification |
| CO3 | Explain and evaluate the physical properties of soil |
| CO4 | Explain and estimate the physio- chemical properties of soil |
| CO5 | Describe the biological properties of soil and its influence |
| CO6 | Analyze the soil pollutant factors and recommend suitable remedial measures for soil improvement |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 15 | 8 | - | 7 | - | - | 24 |
| CO2 | 12 | 5 | - | 7 | - | - | 24 |
| CO3 | 20 | - | - | 2 | 1 | - | 23 |
| CO4 | 12 | 5 | 7 | 8 | 1 | 5 | 38 |
| CO5 | - | 15 | - | 1 | - | - | 16 |
| CO6 | - | - | - | - | - | - | - |
|  | | | | | | | **125** |

**Graphical user interface, application

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| **Course Code** | **21AG1302** | **Duration** | **3hrs** |
| **Course Name** | **INTRODUCTORY AGRO-METEOROLOGY & CLIMATE CHANCE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Expand WMO. | | CO1 | U | | 1 |
| 2. | Define Climate? | | CO1 | R | | 1 |
| 3. | The ionosphere layer of atmosphere is also called\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | List out the Weather hazards? | | CO2 | R | | 1 |
| 5. | Expand IMD. | | CO2 | U | | 1 |
| 6. | Define Meteorology. | | CO2 | R | | 1 |
| 7. | Expand the term ITCZ. | | CO3 | U | | 1 |
| 8. | Give the formula for heliothermal unit. | | CO3 | R | | 1 |
| 9. | Define maximum temperature? | | CO3 | U | | 1 |
| 10. | The role of ozone layer is\_\_\_\_\_\_\_\_ | | CO4 | U | | 1 |
| 11. | Expand the term NEM. | | CO4 | U | | 1 |
| 12. | The \_\_\_\_\_\_is the imaginary lines joins the places having the same solar radiation. | | CO4 | R | | 1 |
| 13. | Brief about meteorological Drought. | | CO5 | R | | 1 |
| 14. | List out the greenhouse gaseous? | | CO5 | R | | 1 |
| 15. | List out the types breeze. | | CO6 | U | | 1 |
| 16. | Define global warming? | | CO6 | R | | 1 |
| 17. | Give the formula for GDD? | | CO6 | U | | 1 |
| 18. | The \_\_\_\_\_\_ is the imaginary lines joins the places having the same wind. | | CO1 | R | | 1 |
| 19. | Give the different types of precipitation. | | CO2 | U | | 1 |
| 20. | List out the uses of weather forecasting in allied sectors? | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Differentiate weather and climate. | | CO2 | | U | 5 |
| 22. | Discuss different types of weather forecasting and its uses in agriculture. | | CO4 | | U | 5 |
| 23. | Explain mountain wind and valley wind with a neat diagram. | | CO2 | | A | 5 |
| 24. | Define Ozone layer and its importance. | | CO6 | | A | 5 |
| 25. | Write the cloud seeding and its types. | | CO5 | | U | 5 |
| 26. | Discuss impact of climate change on agriculture. | | CO3 | | A | 5 |
| 27. | Explain global warming. | | CO1 | | R | 5 |
| 28. | Describe drought, floods, frost. | | CO3 | | R | 5 |
| 29. | Define weather modification and its use on agriculture. | | CO2 | | R | 5 |
| 30. | Write the different droughts in detail. | | CO3 | | U | 5 |
| 31. | Write the different forms of precipitation. | | CO5 | | U | 5 |
| 32. | Define solar radiation and its impacts on agriculture. | | CO5 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss major monsoon mechanism in India. | CO3 | | U | 8 |
|  | b. | Explain in detail stratification of atmosphere with neat diagram. | CO3 | | R | 7 |
| 34. | a. | Explain the radiation laws and its impact on agriculture. | CO1 | | R | 7 |
|  | b. | Explain in detail the permanent pressure and wind belt of the earth with a neat diagram. | CO4 | | A | 8 |
| 35. | a. | Explain the different agroclimatic zones of Tamil Nadu. | CO2 | | U | 7 |
|  | b. | Define agricultural meteorology with its scope and importance. | CO3 | | U | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the significance of agricultural metrology, climate and weather. |
| CO2 | Discuss the various atmospheric weather variables and its significance in crop production. |
| CO3 | Understand crop weather relationships for efficient crop production. |
| CO4 | Acquire knowledge on weather forecasting techniques and effect of climate change on crop  Production. |
| CO5 | Describe artificial rainmaking, precipitation, monsoons and its importance in Indian Agriculture. |
| CO6 | Discuss global warming, and its effect on regional and national agriculture. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 15 | 1 |  |  |  |  | 16 |
| CO2 | 7 | 14 | 5 |  |  |  | 26 |
| CO3 | 13 | 23 | 5 |  |  |  | 41 |
| CO4 | 1 | 8 | 8 |  |  |  | 17 |
| CO5 | 2 | 15 |  |  |  |  | 17 |
| CO6 | 1 | 2 | 5 |  |  |  | 8 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG1303** | **Duration** | **3hrs** |
| **Course Name** | **AGRICULTURAL MICROBIOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Who disproved abiogenesis? | | | CO1 | R | | 1 |
| 2. | Define conjugation. | | | CO5 | R | | 1 |
| 3. | Who discovered the causal organism of tuberculosis? | | | CO1 | R | | 1 |
| 4. | The symbiont harboured in the dorsal leaves of *Azolla* species, which aids in N fixation is \_\_\_\_\_\_\_\_\_\_. | | | CO4 | U | | 1 |
| 5. | What are antibiotics? | | | CO2 | U | | 1 |
| 6. | Name one gram negative bacteria. | | | CO4 | U | | 1 |
| 7. | Who is the founder of soil microbiology? | | | CO3 | U | | 1 |
| 8. | Define pasteurization. | | | CO3 | R | | 1 |
| 9. | * \_\_\_\_\_\_\_\_\_\_ s an obligate intracellular parasites that multiply inside bacteria. | | | CO3 | An | | 1 |
| 10. | Give an example of anaerobic bacteria. | | | CO3 | U | | 1 |
| 11. | The enzyme responsible for the reduction of nitrogen (N2) to ammonia (NH3) is called \_\_\_\_\_\_\_\_\_\_. | | | CO1 | U | | 1 |
| 12. | What is Pili? | | | CO1 | R | | 1 |
| 13. | \_\_\_\_\_\_\_\_\_\_ is called as filamentous bacteria. | | | CO3 | R | | 1 |
| 14. | Mycoplasmas are bacteria that lacks \_\_\_\_\_\_\_\_\_\_. | | | CO2 | R | | 1 |
| 15. | Define Tyndallisation. | | | CO4 | U | | 1 |
| 16. | The extra chromosomal DNA molecules in bacteria are called as \_\_\_\_\_\_\_\_\_\_. | | | CO5 | R | | 1 |
| 17. | Give an example of cellulolytic bacteria and fungi. | | | CO4 | R | | 1 |
| 18. | Name the apparatus used for sterilization by moist heat. | | | CO1 | R | | 1 |
| 19. | What are transposons? | | | CO4 | U | | 1 |
| 20. | Name a disinfectant that kills microorganisms. | | | CO6 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | List out the contributions of Louis Pasteur. | | | CO1 | | An | 5 |
| 22. | Differentiate Gram negative and Gram positive bacteria with suitable diagrams. | | | CO3 | | U | 5 |
| 23. | Explain germ theory of disease. | | | CO1 | | An | 5 |
| 24. | Illustrate the flagellation types in bacteria. | | | CO1 | | U | 5 |
| 25. | Compare and contrast prokaryotes and eukaryotes. | | | CO5 | | E | 5 |
| 26. | Define biopesticides. Explain the mechanism of action of *Bacillus thuringiensis.* | | | CO6 | | A | 5 |
| 27. | Explain the beneficial activities of soil microorganims in the rhizosphere. | | | CO4 | | E | 5 |
| 28. | Detail the cross inoculation groups of *Rhizobium.* | | | CO6 | | U | 5 |
| 29. | Describe the genetics of nodulation and nitrogen fixation in leguminous plants. | | | CO4 | | U | 5 |
| 30. | Explain Sulphur cycle. | | | CO2 | | A | 5 |
| 31. | List out the different types of biofertilizers and explain its importance in agriculture. | | | CO6 | | An | 5 |
| 32. | Explain endophytic diazotroph with a suitable example. | | | CO6 | | E | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Summarize the main features of growth curve. | CO2 | | U | 8 |
|  | | b. | Describe Lac Operon in detail. | CO5 | | U | 7 |
| 34. | | a. | Explain generalized and specialized transduction. | CO5 | | E | 8 |
|  | | b. | Define biological nitrogen fixation and discuss the process. | CO4 | | An | 7 |
| 35. | | a. | Explore the importance of phosphate solubilizing biofertilizer. | CO4 | | E | 8 |
|  | | b. | Summarize the nutritional requirements of bacteria. | CO2 | | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Comprehend the importance and role of microbes in agricultural production. |
| CO2 | Understand principles of microscopy, sterilization techniques and nutrient media preparation. |
| CO3 | Enumerate microbial load in soil and perform isolation, culturing and purification of microbes. |
| CO4 | Explain the role of microbes in enhancing soil fertility. |
| CO5 | Employ genetic transformation methods using microbes in crop improvement. |
| CO6 | Explore and develop biofertilizers, biopesticides and biofuels. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 4 | 6 |  | 10 |  |  | 20 |
| CO2 | 1 | 16 | 5 |  |  |  | 22 |
| CO3 | 2 | 7 |  | 1 |  |  | 10 |
| CO4 | 1 | 9 |  | 7 | 13 |  | 30 |
| CO5 | 2 | 7 |  |  | 13 |  | 22 |
| CO6 | 1 | 5 | 5 | 5 | 5 |  | 21 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG1351** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF PLANT PATHOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Who is the Father of Plant Pathology? | | CO1 | R | | 1 |
| 2. | Fungi growing only on living host plant is called as \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 3. | The Great Bengal Famine in the year of 1943 was caused due to the outbreak of \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | Directorate of Plant Protection, Quarantine and Storage located at \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 5. | Mass of hyphae is called as \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 6. | The fruiting body of mushroom is called as \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 7. | The rust pathogen requires more than one host to complete their life cycle is called as \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 8. | Example for pycnidium producing fungi \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 9. | The first plant bacterial disease fire blight of apple is caused by \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 10. | Bacteria that contain one flagellum at both end is called as \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 11. | Name the fungus that produces naked asci \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 12. | Name the total root parasite \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 13. | Solar heat treatment technique is used for the management of \_\_\_\_\_\_\_\_\_\_\_ disease in Wheat. | | CO6 | An | | 1 |
| 14. | Write an example for gram positive bacteria \_\_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 15. | Name the vector that transmits little leaf of Brinjal. | | CO4 | R | | 1 |
| 16. | Khaira disease of Rice is caused by \_\_\_\_\_\_\_\_\_\_\_ deficiency | | CO2 | R | | 1 |
| 17. | Name the gelatinous disc produced by Albugo pathogen | | CO6 | R | | 1 |
| 18. | The resistance that is controlled by one or two genes is termed as \_\_\_\_\_\_\_\_\_\_\_. | | CO5 | U | | 1 |
| 19. | Sulphur fungicides is used for the effective management of \_\_\_\_\_\_\_\_\_\_\_ disease. | | CO6 | U | | 1 |
| 20. | Name a viroid disease \_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Outline the Koch’s Postulates. | | CO2 | | U | 5 |
| 22. | Distinguish between vertical and horizontal resistance. | | CO5 | | An | 5 |
| 23. | Distinguish between Oidium, Oidiopsis and Ovulariopsis powdery mildew with a neat diagrams. | | CO3 | | An | 5 |
| 24. | Summarize the sporangiophore branching in downy mildew fungi with a suitable diagram. | | CO3 | | U | 5 |
| 25. | Summarize the dispersal of plant pathogens. | | CO4 | | U | 5 |
| 26. | Explain the sexual fruiting bodies with suitable example. | | CO3 | | E | 5 |
| 27. | Write the causal organism for the following diseases; (1) Rice blast (2) Late blight of potato (3) Powdery mildew of Pulses (4) Downy mildew of Pearl millet (5) Damping off of tomoto. | | CO6 | | U | 5 |
| 28. | Distinguish between alternate and collateral host. | | CO3 | | An | 5 |
| 29. | Distinguish the symptom between Powdery mildewand Downy mildew. | | CO2 | | An | 5 |
| 30. | Classify plant diseases based on the occurrence and severity. | | CO2 | | U | 5 |
| 31. | List out five important symptoms of viral diseases with examples. | | CO2 | | R | 5 |
| 32. | Classify bacteria based on flagella with suitable diagrams. | | CO2 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Summarize the taxonomic position, symptom and life cycle of late blight of potato. | CO2 | | U | 8 |
|  | b. | List out the principles of crop disease management and elaborate exclusion. | CO6 | | C | 7 |
| 34. | a. | Summarize the taxonomic position, symptom and life cycle of *Pythium aphanidermatum.* | CO2 | | U | 8 |
|  | b. | Explain the Asexual fruiting bodies and Asexual spores with neat diagram. | CO3 | | U | 7 |
| 35. | a. | Write the different modes of dispersal of plant pathogens | CO3 | | U | 8 |
|  | b. | Explain the different types of phanerogamic parasites with suitable diagram. | CO3 | | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Remember the factors responsible for disease development. |
| CO2 | Understand the importance of different plant pathogens with their characteristics and classification. |
| CO3 | Recall the reproduction, survival and transmission of plant pathogens. |
| CO4 | Outline the mode of dispersal, role of enzymes and toxins in disease development. |
| CO5 | Analyze defense mechanism in plants and the epidemiological factors. |
| CO6 | Apply knowledge on plant disease management. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | - | - | - | - | - | 2 |
| CO2 | 13 | 33 | - | 5 | - | - | 51 |
| CO3 | 3 | 28 | - | 10 | 5 | - | 46 |
| CO4 | 1 | 5 | - | - | - | - | 6 |
| CO5 | - | 1 | - | 5 | - | - | 6 |
| CO6 | 1 | 6 | - | 1 | - | 6 | 14 |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **21AG1451** | **Duration** | **3hrs** |
| **Course Name** | **INTRODUCTORY SOIL AND WATER CONSERVATION ENGINEERING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Expand USLE. | | CO1 | U | | 1 |
| 2. | What is LS factor? | | CO1 | U | | 1 |
| 3. | Define stream bank erosion. | | CO2 | U | | 1 |
| 4. | Define on rill erosion. | | CO2 | U | | 1 |
| 5. | What do meant by sheet erosion? | | CO2 | U | | 1 |
| 6. | Define erosivity. | | CO1 | U | | 1 |
| 7. | Write shortly on RUSLE. | | CO3 | U | | 1 |
| 8. | Write the importance of soil conservation. | | CO 3 | An | | 1 |
| 9. | Differentiate between run-off and flood water harvesting. | | CO4 | An | | 1 |
| 10. | Define contour interval. | | CO4 | U | | 1 |
| 11. | Write on four run-off measuring devices. | | CO4 | R | | 1 |
| 12. | Mention on various methods of measuring rainfall erosivity. | | CO2 | U | | 1 |
| 13. | What is grassed waterway? | | CO4 | U | | 1 |
| 14. | Define wind erosion. | | CO5 | U | | 1 |
| 15. | What are factors affecting wind erosion? | | CO5 | An | | 1 |
| 16. | Define graded bund. | | CO6 | U | | 1 |
| 17. | Define table top bench terrace. | | CO4 | U | | 1 |
| 18. | Define shelterbelt. | | CO6 | U | | 1 |
| 19. | What are factors affecting water erosion? | | CO2 | E | | 1 |
| 20. | Define windbreak. | | CO6 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Enumerate the applications and limitations of USLE. | | CO 3 | | U | 5 |
| 22. | Explain the mechanical measures to control water erosion. | | CO1 | | A | 5 |
| 23. | Explain the method of EI30 and KE>25 index of estimation of rainfall erosivity. | | CO2 | | U | 5 |
| 24. | Explain in detail the classification of gullies. | | CO2 | | An | 5 |
| 25. | Explain in detail the land capability classification. | | CO 4 | | U |  |
| 26. | Write in detail the types of water erosion. | | CO 5 | | U | 5 |
| 27. | Explain in details the types of water harvesting and their importance. | | CO 4 | | U | 5 |
| 28. | Write short notes on methods of contouring. | | CO 4 | | A | 5 |
| 29. | Differentiate between the contour bund and graded bund. | | CO5 | | U | 5 |
| 30. | Write short notes on measuring soil erodibility. | | CO2 | | E | 5 |
| 31. | Describe the mechanics of wind erosion. | | CO5 | | U | 5 |
| 32. | Write on the various types of terracing. | | CO4 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain in detail (i) Specification of bund.  (ii) Construction of bund. | CO2 | | A | 8 |
|  | b. | Discuss in detail the causes and factors affecting soil erosion. | CO1 | | E | 7 |
| 34. | a. | Explain in detail the factors associated with Universal Soil Loss Equation. | CO3 | | An | 8 |
|  | b. | Explain in detail the gully control measures and their classification. | CO | | A | 7 |
| 35. | a. | Give account on the various water harvesting techniques. | CO | | E | 8 |
|  | b. | Discuss in detail the designing of grassed waterways. | CO | | A | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | The students will attain the basic concepts of soil and water conservation. |
| CO2 | To adopt the gully erosion control measures. |
| CO3 | To measure the soil loss using different techniques. |
| CO4 | Explain the water harvesting techniques. |
| CO5 | Understand the mechanics of wind erosion. |
| CO6 | Adapt the different control measures of wind erosion. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 2 | 5 | - | 7 | - | 15 |
| CO2 | - | 9 | 8 | 5 | 6 | - | 28 |
| CO3 | 1 | 6 | - | 8 | - | - | 15 |
| CO4 | 1 | 18 | 12 | 1 | - | - | 32 |
| CO5 | - | 16 | - | 1 | 8 | - | 25 |
| CO6 | - | 3 | 7 | - | - | - | 10 |
|  | | | | | | | **125** |



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| **CoruseCode** | **21AG1501** | **Duration :** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF PLANT BIOCHEMISTRY AND BIOTECHNOLOGY** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
|  |  | **PART-A (20 X 1 =20 MARKS)** | | | |
| 1. | Give an example for a monosaccharide. | | CO2 | R | 1 |
| 2. | Define Zwitterions. | | CO1 | R | 1 |
| 3. | What are enzymes? | | CO3 | R | 1 |
| 4. | What are polysaccharides? Give an example. | | CO2 | R | 1 |
| 5. | Define a nucleotide. | | CO2 | R | 1 |
| 6. | Differentiate A & B forms of DNA. | | CO2 | U | 1 |
| 7. | Name any two types of RNA. | | CO2 | R | 1 |
| 8. | What is the net ATP produced per glucose molecule in glycolysis? | | CO3 | R | 1 |
| 9. | Name the enzyme complex II in Electron transport chain. | | CO3 | R | 1 |
| 10. | Define a callus. | | CO4 | R | 1 |
| 11. | What are cybrids? | | CO4 | R | 1 |
| 12. | Name a rhizospheric bacteria used in gene transfer techniques. | | CO3 | R | 1 |
| 13. | Define transgenesis. | | CO4 | R | 1 |
| 14. | Expand PCR. | | CO5 | R | 1 |
| 15. | Define embryogenesis. | | CO4 | R | 1 |
| 16. | What is an explant culture? | | CO5 | R | 1 |
| 17. | What are restriction enzymes? | | CO6 | R | 1 |
| 18. | What is somaclonal hybridization? | | CO5 | R | 1 |
| 19. | Define micropropagation. | | CO4 | R | 1 |
| 20. | List any two transgenic plants. | | CO4 | R | 1 |

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|  |  | **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Describe the properties of water. | | CO1 | U | 5 |
| 22. | Define a buffer. Write the importance of buffers. | | CO1 | R | 5 |
| 23. | Sketch the structure of any two disaccharides. | | CO2 | U | 5 |
| 24. | List the properties of enzymes. | | CO2 | R | 5 |
| 25. | What are allosteric enzymes? State their importance. | | CO2 | R | 5 |
| 26. | Differentiate DNA and RNA. | | CO2 | U | 5 |
| 27. | Describe the secondary structure of RNA. | | CO2 | U | 5 |
| 28. | Explain β Oxidation of lipids. | | CO5 | U | 5 |
| 29. | Explain the need for embryo culture in plants. | | CO4 | U | 5 |
| 30. | Explain the method to prepare synthetic seeds. | | CO4 | U | 5 |
| 31. | Write about cryopreservation. | | CO4 | U | 5 |
| 32. | Describe TCA Cycle with a neat sketch. | | CO4 | U | 5 |

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|  |  | | **PART C(2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | |
| 33. | a. | Classify carbohydrates and write their importance. | | CO2 | A | 8 |
| b. | Explain the structural organization of proteins. | | CO2 | U | 7 |
| 34. | a. | Summarize the mechanism of action of enzymes. | | CO5 | U | 8 |
| b. | Explain Electron transport chain and chemiosmotic hypothesis. | | CO5 | U | 7 |
| 35. | a. | Examine the role of trangenesis in crop improvement. | | CO4 | A | 8 |
| b. | Explain the physical methods of gene transfer. | | CO5 | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the importance of biomolecules in medicine, agriculture, pharmaceuticals and ethics |
| CO2 | Remember the structure and classification of biomolecules |
| CO3 | Recall the role of biomolecules in photosynthesis, protein synthesis and DNA synthesis |
| CO4 | Remember the developments in biochemistry |
| CO5 | Explain the overall aspects of integration of metabolic processes |
| CO6 | Apply the knowledge on structure of carbohydrates, proteins, vitamins, nucleic acids and lipids in drug discovery |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 6 | 5 | - | - | - | - | 11 |
| CO2 | 14 | 23 | 8 | - | - | - | 45 |
| CO3 | 4 | - | - | - | - | - | 4 |
| CO4 | 6 | 20 | 8 | - | - | - | 34 |
| CO5 | 3 | 27 | - | - | - | - | 30 |
| CO6 | 1 | - | - | - | - | - | 1 |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **21AG1503** | **Duration :** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF CROP PHYSIOLOGY** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome / Pattern** | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | |
| 1. | \_\_\_\_\_\_\_\_\_\_ is the cell organelle which is the storehouse of genetic information. | CO1/R | 1 |
| 2. | Name the mobile compound that shuttles electron between PS I and PS II. | CO 3/R | 1 |
| 3. | Give an example of plant growth promoter. | CO 6/R | 1 |
| 4. | Which is the site of glycolysis? | CO 4/R | 1 |
| 5. | \_\_\_\_\_\_\_\_\_\_ is the movement of water from higher concentration to lower concentration. | CO 2/R | 1 |
| 6. | The pore present in the leaves through which exchange of gases takes place is \_\_\_\_\_\_\_\_\_\_. | CO 2/R | 1 |
| 7. | The specialized water absorbing tissue in orchids is \_\_\_\_\_\_\_\_\_\_. | CO 2 /R | 1 |
| 8. | The hormone involved in seed germination is \_\_\_\_\_\_\_\_\_\_. | CO 6/ R | 1 |
| 9. | \_\_\_\_\_\_\_\_\_\_ is the extension of epidermal cells. | CO 1/ R | 1 |
| 10. | Expand HI. | CO 5/ R | 1 |
| 11. | The site of TCA cycle is \_\_\_\_\_\_\_\_\_\_. | CO 4/ R | 1 |
| 12. | The fluid present inside chloroplast is \_\_\_\_\_\_\_\_\_\_. | CO 1/ R | 1 |
| 13. | Yellowing of leaves due to Nitrogen deficiency is seen in \_\_\_\_\_\_\_\_\_\_ leaves | CO 2/ R | 1 |
| 14. | The water potential of pure water is \_\_\_\_\_\_\_\_\_\_. | CO 3/ R | 1 |
| 15. | The breakdown of fattyacids is called as \_\_\_\_\_\_\_\_\_\_ oxidation. | CO 4/ R | 1 |
| 16. | The \_\_\_\_\_\_\_\_\_\_ is the precursor of Auxin biosynthesis. | CO 6/ R | 1 |
| 17. | The force of attraction between water molecules is called as \_\_\_\_\_\_\_\_\_\_. | CO 3/R | 1 |
| 18. | Expand ABA. | CO 6/R | 1 |
| 19. | Exudation of water molecules from uninjured parts of leaves is called as \_\_\_\_\_\_\_\_\_\_. | CO 2/R | 1 |
| 20. | The growing of plants in artificial nutrient medium is called as \_\_\_\_\_\_\_\_\_\_. | CO 2/R | 1 |

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| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Explain the light Reaction of photosynthesis. | CO 4/ U | 5 |
| 22. | With a neat diagram explain the structure and function of mitochondria. | CO 1/ U | 5 |
| 23. | Differentiate C3 and C4 photosynthesis. | CO 4/An | 5 |
| 24. | Discuss the different type of soil water based on the availability to plants. | CO 2/ U | 5 |
| 25. | Explain the opening and closing of stomata with a neat diagram. | CO 3/ U | 5 |
| 26. | What are the physiological roles of Auxin? | CO 6/ R | 5 |
| 27. | Define the following VPD, Stomata, Osmosis, Cell, photosynthesis. | CO 2/ R | 5 |
| 28. | Discuss ABA as stress hormone. | CO 6/ U | 5 |
| 29. | Explain water potential, its units and components. | CO 3/ U | 5 |
| 30. | Discuss the 3 types of C4 pathway. | CO 4/ U | 5 |
| 31. | Explain the ethylene biosynthetic pathway. | CO 6/U | 5 |
| 32. | List and define any five growth parameters. | CO 5/R | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Discuss the different pathways of water movement in plants with neat diagram. | CO 2/U | 10 |
| b. | Classify the stomata based on their shape. | CO 2/U | 5 |
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| 34. | a. | Describe the two visible symptoms of five major macronutrients. | CO 3/U | 10 |
| b. | Discuss the factors that affect transpiration. | CO 3/U | 5 |
|  |  |  |  |  |
| 35. | a. | Explain the different biosynthetic pathway of auxin. | CO 6/U | 10 |
| b. | List any five practical applications of PGR in agriculture and horticulture. | CO 6/R | 5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the physiology of plant tissues and cells. |
| CO2 | Remember water movement in plant systems like diffusion and osmosis. |
| CO3 | Apply the concept of water relations, mineral uptake in the field of agriculture. |
| CO4 | Summarize the various physiological processes. |
| CO5 | Measure and analyze the physiological parameters of crops. |
| CO6 | Practice the use of growth Regulators correctly to solve physiological problems. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 5 |  |  | - | - | 8 |
| CO2 | 11 | 20 |  |  |  |  | 31 |
| CO3 | 3 | 25 |  |  | - | - | 28 |
| CO4 | 3 | 10 |  | 5 |  |  | 18 |
| CO5 | 6 | - | - | - | - | - | 6 |
| CO6 | 9 | 25 | - | - | - | - | 34 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG2004** | **Duration** | **3hrs** |
| **Course Name** | **CROP PRODUCTION TECHNOLOGY-1 (KHARIF CROPS)** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Paddy varieties maturing in 100-120 days are called \_\_\_\_\_\_\_\_\_\_ duration varieties. | | CO1 | E | | 1 |
| 2. | Indian Institute of Rice Research (IIRR) is located at \_\_\_\_\_\_\_\_\_\_. | | CO1 | U | | 1 |
| 3. | CSH 22 SS is a \_\_\_\_\_\_\_\_\_\_ sorghum. | | CO2 | R | | 1 |
| 4. | Red gram, Tur, Arhar are common names of \_\_\_\_\_\_\_\_\_\_ pea . | | CO2 | R | | 1 |
| 5. | ----------- crop is called “Camel Crop” because of its ability to grow in arid soils and withstand prolonged droughts. | | CO2 | U | | 1 |
| 6. | Cotton seed + lint is known as \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 7. | The common name of *Pennisetum glaucum* is \_\_\_\_\_\_\_\_\_\_ millet. | | CO3 | U | | 1 |
| 8. | The common name of Eleusine coracana is \_\_\_\_\_\_\_\_\_\_millet. | | CO3 | R | | 1 |
| 9. | Nitrogen fixing biofertilizer used for seed treatment in non- legumes is \_\_\_\_\_\_\_\_\_\_. | | CO3 | An | | 1 |
| 10. | Nitrogen fixing biofertilizer used for seed treatment in legumes is \_\_\_\_\_\_\_\_\_\_. | | CO4 | An | | 1 |
| 11. | The pre-emergence herbicide commonly recommended in pulse crop is \_\_\_\_\_\_\_\_\_\_. | | CO4 | U | | 1 |
| 12. | One mg in one litre of water is \_\_\_\_\_\_\_\_\_\_ ppm. | | CO4 | E | | 1 |
| 13. | Moong is the common name of \_\_\_\_\_\_\_\_\_\_ gram. | | CO5 | R | | 1 |
| 14. | The oil percentage of sesame seeds is \_\_\_\_\_\_\_\_\_\_ %. | | CO5 | E | | 1 |
| 15. | \_\_\_\_\_\_\_\_\_\_crop is called as the ‘King’ of oilseeds. | | CO6 | U | | 1 |
| 16. | \_\_\_\_\_\_\_\_\_\_is a pulse cum oilseed crop and is the most important oilseed crop of India. | | CO6 | R | | 1 |
| 17. | On an average, \_\_\_\_\_\_\_\_\_\_ grains contain about, 43.2% protein and 20.0% oils. | | CO6 | U | | 1 |
| 18. | One bale of cotton is \_\_\_\_\_\_\_\_\_\_ kg. | | CO2 | C | | 1 |
| 19. | Golden Fiber Revolution is the revolution in \_\_\_\_\_\_\_\_\_\_ crop. | | CO2 | A | | 1 |
| 20. | Hybrid Napiergrass is a cross between Napier grass and \_\_\_\_\_\_\_\_\_\_ crop. | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Distinguish sorghum poisoning and sorghum injury. | | CO3 | | An | 5 |
| 22. | Explain the climatic and soil requirement of bajra. | | CO4 | | U | 5 |
| 23. | Write a short note on nutri cereals. | | CO2 | | C | 5 |
| 24. | Classify red gram varieties cultivated in India based on their duration and give one example each. | | CO5 | | R | 5 |
| 25. | Explain seed treatment in black gram. | | CO6 | | An | 5 |
| 26. | Write a short note on classification of groundnut based on growth habits with examples. | | CO3 | | A | 5 |
| 27. | Explain the foliar nutrition of soybean crop. | | CO1 | | E | 5 |
| 28. | Explain the economic importance of cotton in India. | | CO2 | | U | 5 |
| 29. | Explain nipping in cotton and Bt cotton. | | CO6 | | A | 5 |
| 30. | Workout the commercial fertilizers (urea (16% N), DAP (18-46-0) and Muriate of potash (60 % K) required for supplying NPK @ 25: 50:25 kg/ha for red gram? | | CO5 | | E | 5 |
| 31. | What are the parents of hybrid Napier? What are the specialties of hybrid Napier grass? | | CO3 | | C | 5 |
| 32. | Give a brief account on the cultivation of fodder sorghum. | | CO2 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Give brief description about the cropping seasons in India. | CO4 | | A | 8 |
|  | b. | List out the three major and five minor millets cultivated in India with their botanic names. | CO5 | | R | 7 |
| 34. | a. | Explain the land preparation, seed treatment, sowing, and spacing and weed management in soybean. | CO1 | | C | 7 |
|  | b. | Explain the reasons for low production and productivity of pulses in India. | CO6 | | An | 8 |
| 35. | a. | Mention the species of cotton grown in India with the percentage of area under each species. | CO3 | | E | 7 |
|  | b. | Write in detail about processing of jute. | CO2 | | An | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the kharif crops and crop production technology for kharif crops. |
| CO2 | Gain knowledge on geographical distribution of kharif crops uses and products. |
| CO3 | Recall the morphological features and crop production requirements for kharif season crops. |
| CO4 | Remember soil and climatic requirements of different kharif crop varieties. |
| CO5 | Acquire the knowledge on crop management practices for kharif season. |
| CO6 | Apply the acquired knowledge to guide the farmers for cultivating kharif crops. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 0 | 1 | 0 | 0 | 6 | 7 | 14 |
| CO2 | 2 | 11 | 1 | 8 | 0 | 6 | 28 |
| CO3 | 2 | 1 | 5 | 6 | 7 | 5 | 26 |
| CO4 | 0 | 7 | 8 | 1 | 1 | 0 | 17 |
| CO5 | 13 | 0 | 0 | 0 | 6 | 0 | 19 |
| CO6 | 1 | 2 | 5 | 13 | 0 | 0 | 21 |
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| **Course Code** | **21AG2012** | **Duration** | **3hrs** |
| **Course Name** | **WEED MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | \_\_\_\_\_\_\_\_ is a total stem parasite, in which plants it is associated \_\_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 2. | \_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_ weeds are poisonous weeds to animals and human being. | | | CO1 | R | | 1 |
| 3. | \_\_\_\_\_\_\_\_ weed possesses all the three types of dormancy. | | | CO1 | U | | 1 |
| 4. | Toxic substance released from one species may affected the other species of plant is termed as \_\_\_\_\_\_\_\_ . | | | CO2 | U | | 1 |
| 5. | Unwanted plants which have economic value and growing out of their proper place are called as \_\_\_\_\_\_\_\_ . | | | CO2 | A | | 1 |
| 6. | \_\_\_\_\_\_\_\_ weed is very good for the soil binding plant on erodible land. | | | CO2 | E | | 1 |
| 7. | *Trianthema portulacastrum* produce \_\_\_\_\_\_\_\_ number of seeds per plant. | | | CO1 | C | | 1 |
| 8. | Milk quality is reduced due to pungent odour of\_\_\_\_\_\_\_\_ weed. | | | CO3 | A | | 1 |
| 9. | Weeds are parasitic in nature infest only host crops know as \_\_\_\_\_\_\_\_ . | | | CO3 | C | | 1 |
| 10. | Leaves &inflorescence of *Parthenium* sp.affect the germination and seedling of \_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_ crop. | | | CO3 | E | | 1 |
| 11. | \_\_\_\_\_\_\_\_ year 2,4-D was discovered & number of currently available herbicides\_\_\_\_\_\_\_\_ . | | | CO2 | A | | 1 |
| 12. | \_\_\_\_\_\_\_\_ herbicides kill some species without injuring the other vegetation. eg\_\_\_\_\_\_\_\_ . | | | CO2 | E | | 1 |
| 13. | The growth regulator herbicides are \_\_\_\_\_\_\_\_ &\_\_\_\_\_\_\_\_. | | | CO2 | E | | 1 |
| 14. | Chemical which are used to inactive the applied herbicides are called \_\_\_\_\_\_\_\_ . | | | CO2 | An | | 1 |
| 15. | *Phalaris minor* in wheat can be controlled by \_\_\_\_\_\_\_\_ herbicides. | | | CO2 | E | | 1 |
| 16. | Sikkimate pathway block by \_\_\_\_\_\_\_\_ herbicide. | | | CO2 | E | | 1 |
| 17. | Give the example herbicide resistant cotton\_\_\_\_\_\_\_\_ . | | | CO3 | C | | 1 |
| 18. | First herbicide resistant weed in India \_\_\_\_\_\_\_\_. | | | CO3 | E | | 1 |
| 19. | Give an example for low dose herbicide for Early post emergence in direct seed rice. | | | CO3 | R | | 1 |
| 20. | Inhibitors of photosynthesis \_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_ Herbicides. | | | CO3 | E | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Explain the characteristics of weeds. | | | CO1 | | R | 5 |
| 22. | Explain about losses caused by weeds. | | | CO 1 | | U | 5 |
| 23. | Explain about aquatic weeds management methods. | | | CO1 | | U | 5 |
| 24. | Explain about dispersal of weed seeds. | | | CO1 | | A | 5 |
| 25. | Explain in detail about biological weed management. | | | CO2 | | E | 5 |
| 26. | State the factors affecting competitive ability of crop against weeds. | | | CO2 | | An | 5 |
| 27. | Explain about weed control methods. | | | CO2 | | C | 5 |
| 28. | IWM in crops and cropping systems. | | | CO3 | | A | 5 |
| 29. | Explain about pathways of herbicide dissipation. | | | CO3 | | C | 5 |
| 30. | State the factor influencing persistence of herbicide in soil. | | | CO3 | | U | 5 |
| 31. | Explain about different herbicide formulations. | | | CO3 | | C | 5 |
| 32. | Explain about herbicide use efficiency with adjuvants and protectants. | | | CO3 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Write about principles and methods of weed management. | CO3 | | R | 7 |
|  | | b. | Discuss in detail the cultural and mechanical methods of weed management. | CO2 | | U | 8 |
| 34. | | a. | Explain the allelopathy and mention the types of allelopathy. | CO3 | | A | 7 |
|  | | b. | Discuss the effect of allelopathy in crop and weed & factors influencing allelopathy. | CO4 | | An | 8 |
| 35. | | a. | Write the advantage and disadvantages of herbicides. | CO5 | | E | 7 |
|  | | b. | Discuss the management of herbicide residues in soil. | CO6 | | C | 8 |

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|  | **COURSE OUTCOMES** |
| CO1 | Identify and classify the weeds of terrestrial and aquatic ecosystems. |
| CO2 | Understand the weeds of different agro-ecosystems. |
| CO3 | Assess the impact of weeds on crops and cropping systems. |
| CO4 | Formulate Integrated Weed Management Practices. |
| CO5 | Recommend various weed management practices to farmers. |
| CO6 | Monitor and predict occurrence and invasion of new weeds in different ecosystems. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 11 | 6 | - | - | 5 | - | 22 |
| CO2 | - | 12 | 18 | - | 5 | - | 35 |
| CO3 | 6 | - | 8 | - | 3 | 3 | 20 |
| CO4 | - | - | 8 | - | - | - | 8 |
| CO5 | - | - | - | - | 7 | - | 7 |
| CO6 | - | - | - | - | - | 8 | 8 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG2052** | **Duration** | **3hrs** |
| **Course Name** | **AGRICULTURAL FINANCE AND COOPERATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Where is the head office of NAFED? | | CO3 | R | | 1 |
| 2. | What is called as current assets? | | CO2 | R | | 1 |
| 3. | Find true or false: Under Kisan Credit Card scheme, farmers should be the residents of the bank’s operational area. | | CO6 | R | | 1 |
| 4. | What is called as NPV? | | CO2 | R | | 1 |
| 5. | Which committee recommended the setting up of Farmers Service Cooperative society? | | CO3 | R | | 1 |
| 6. | What is called as Micro credit? | | CO3 | R | | 1 |
| 7. | Which is the central bank of our country? | | CO3 | R | | 1 |
| 8. | What isIMF? | | CO3 | R | | 1 |
| 9. | When wasAsian Development Bank established? | | CO3 | R | | 1 |
| 10. | What is payback period? | | CO2 | R | | 1 |
| 11. | What is IRR? | | CO2 | R | | 1 |
| 12. | Find true or false: Reserve Bank of India was established in 1935. | | CO1 | R | | 1 |
| 13. | Which conference resulted in the formation of world Bank? | | CO3 | R | | 1 |
| 14. | Which committee recommended for the establishment of NABARD? | | CO3 | R | | 1 |
| 15. | Which is the hybrid type of credit agency that combine the goodness of commercial bank and cooperatives? | | CO3 | R | | 1 |
| 16. | What is called as consumer cooperatives? | | CO6 | R | | 1 |
| 17. | Find true or false: Nationalization of 14 banks was made in the year 1969 during the tenure of prime minister Jawaharlal Nehru. | | CO3 | R | | 1 |
| 18. | Which type of credit is given when land is mortgaged as security? | | CO2 | R | | 1 |
| 19. | What are the 5 C’S of credit? | | CO2 | R | | 1 |
| 20. | What is ICA? | | CO3 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Discuss the 3 R’s of credit. | | CO5 | | C | 5 |
| 22. | Distinguish development credit and production credit. | | CO1 | | An | 5 |
| 23. | Write in brief about the functions of RRB’s. | | CO1 | | R | 5 |
| 24. | Explain discounted measures of investment analysis. | | CO5 | | U | 5 |
| 25. | Explain the activities of NAFED. | | CO1 | | E | 5 |
| 26. | Compare financing of agriculture and other sectors. | | CO1 | | An | 5 |
| 27. | Explain about multipurpose cooperative societies. | | CO2 | | E | 5 |
| 28. | Distinguish institutional and non-institutional source of finance. | | CO1 | | An | 5 |
| 29. | Elaborate three important functions of NCUI and NCDC. | | CO3 | | C | 5 |
| 30. | Explain income statement. | | CO4 | | U | 5 |
| 31. | Explain the functions of Lead Bank. | | CO3 | | E | 5 |
| 32. | Explain about Credit Guarantee Corporation of India. | | CO3 | | E | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Summarize the history of Cooperative movement in India. | CO3 | | U | 7.5 |
|  | b. | Explain about the functions of NABARD. | CO1 | | E | 7.5 |
| 34. | a. | Explain the purposes of IMF and World bank. | CO3 | | E | 7.5 |
|  | b. | Elaborate the concept of micro finance. | CO3 | | C | 7.5 |
| 35. | a. | Explain the functions of RBI. | CO3 | | E | 7.5 |
|  | b. | Organize and explain the 7 P’s of credit. | CO1 | | A | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand Financial system in India. |
| CO2 | Apply principles of banking and credit appraisal procedure. |
| CO3 | Analyze credit and deposit services of private, public and cooperative sector banks. |
| CO4 | Prepare and analyze Balance Sheet and Income and Expenditure Statements of a business unit. |
| CO5 | Develop skills in credit analysis, dealing with bankers, loan application procedures. |
| CO6 | Popularize farmer-friendly schemes of Crop insurance and Cooperative warehousing among farmers. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 6 | 0 | 7.5 | 15 | 12.5 | 0 | 41 |
| CO2 | 6 | 0 | 0 | 0 | 5 | 0 | 11 |
| CO3 | 11 | 7.5 |  |  | 25 | 12.5 | 56 |
| CO4 |  | 5 |  |  |  |  | 5 |
| CO5 |  | 5 |  |  |  | 5 | 10 |
| CO6 | 2 |  |  |  |  |  | 2 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG2202** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF PLANT BREEDING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | The chromosome number of the zygote is \_\_\_\_\_\_\_\_\_. | | | CO1 | R | 1 |
| 2. | The name of the scientist who produced the Raphanobrassica. | | | CO1 | R | 1 |
| 3. | The reduction in vigour due to successive generations of selfing. | | | CO1 | U | 1 |
| 4. | The development of seed without fertilization is known as \_\_\_\_\_\_\_\_\_. | | | CO2 | R | 1 |
| 5. | If staminate and pistillate flowers are produced on the same plant it is called \_\_\_\_\_\_\_\_\_. | | | CO2 | U | 1 |
| 6. | The ploidy level of endosperm nucleus is \_\_\_\_\_\_\_\_\_. | | | CO2 | R | 1 |
| 7. | The chromosome number of a somatic cell is designated as \_\_\_\_\_\_\_\_\_. | | | CO3 | U | 1 |
| 8. | Two basic requirements for selection are \_\_\_\_\_\_\_\_\_. | | | CO3 | R | 1 |
| 9. | A cross between an Inbred x Open pollinated variety is called \_\_\_\_\_\_\_\_\_. | | | CO3 | U | 1 |
| 10. | The production of microspore inside the anther is called \_\_\_\_\_\_\_\_\_. | | | CO4 | U | 1 |
| 11. | Name the cereal crop synthesized by crossing wheat and rye. | | | CO4 | U | 1 |
| 12. | Hybrid population is homogeneous and individual plants are \_\_\_\_\_\_\_\_\_ in nature. | | | CO4 | R | 1 |
| 13. | What is transgressive segregation? | | | CO5 | R | 1 |
| 14. | The source of dwarfing gene in wheat | | | CO5 | R | 1 |
| 15. | Occurrence of genetically different tissues adjacent to each other is called \_\_\_\_\_\_\_\_\_. | | | CO6 | U | 1 |
| 16. | Mating between individuals related by ancestry is called \_\_\_\_\_\_\_\_\_. | | | CO6 | R | 1 |
| 17. | Expand NBPGR. | | | CO6 | U | 1 |
| 18. | Name an agricultural crop in Tamil Nādu which received GI tag. | | | CO1 | R | 1 |
| 19. | Define an “Extant Variety”. | | | CO2 | U | 1 |
| 20. | What are essential requirements for registering a variety? | | | CO4 | U | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Define intellectual property. What are the different forms of intellectual property protection? | | | CO1 | An | 5 |
| 22. | Write a short note on Participatory Plant Breeding. | | | CO2 | U | 5 |
| 23. | Briefly explain the biotechnological tools used in crop improvement. | | | CO3 | An | 5 |
| 24. | What is meant by distant hybridization? Give examples. How to overcome the barriers in distant hybridization? | | | CO4 | U | 5 |
| 25. | What are the mechanisms of insect resistance? What are the screening techniques used for insect resistance. | | | CO5 | An | 5 |
| 26. | Distinguish between auto and allopolyploids. How triploids can be used in crop improvement | | | CO6 | U | 5 |
| 27. | Define heterosis. What are the theories to explain the genetic base of heterosis? | | | CO1 | An | 5 |
| 28. | What are the salient features of Farmers right? | | | CO2 | U | 5 |
| 29. | What are the different types of mutation? Give the classification of mutagens with examples. | | | CO3 | An | 5 |
| 30. | What are different types of self-incompatibility? How it used for the production of hybrids? | | | CO4 | U | 5 |
| 31. | What is Hardy-Weinberg Law? Explain the conditions for maintaining the equilibrium constant. | | | CO5 | An | 5 |
| 32. | What are the causes of variation in a pure line variety? | | | CO6 | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | List out the breeding methods suitable for self-pollinated crops. Describe the procedure of Pure line selection. | | CO1 | A | 8 |
|  | b. | Name the breeding methods which involve hybridization. Explain the procedure of pedigree method. | | CO3 | E | 7 |
| 34. | a. | Examine the different types of recurrent schemes used for population improvement. | | CO2 | E | 7 |
|  | b. | Explain the breeding methods suitable for vegetatively propagated plants | | CO4 | A | 8 |
| 35. | a. | Explain the procedure for transfer of dominant gene resistant to rust disease in wheat by using back cross method. | | CO3 | An | 8 |
|  | b. | What are different types of male sterility? Describe the method to transfer Restorer gene to the selected parent. | | CO5 | An | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the basic concepts of plant breeding and genetics. |
| CO2 | Remember origin and diversity of different crops, components of inheritance and variations. |
| CO3 | Apply the knowledge to develop high yielding crops with better quality. |
| CO4 | Produce varieties and hybrids with host plant resistance. |
| CO5 | Apply the protocols of Intellectual Property Rights and patenting practically. |
| CO6 | Analyze Plant Breeders and Farmer’s Rights for research and commercial seed production of high yielding crops. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 1 | 8 | 10 |  |  | 22 |
| CO2 | 2 | 17 |  | 5 | 7 |  | 31 |
| CO3 | 2 | 6 |  | 8 | 7 |  | 23 |
| CO4 | 2 | 7 | 8 |  |  |  | 17 |
| CO5 | 1 | 1 |  | 17 |  |  | 19 |
| CO6 | 2 | 11 |  |  |  |  | 13 |
|  | | | | | | | **125** |

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| **Course Code** | **21AG2304** | **Duration** | **3hrs** |
| **Course Name** | **ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Name the Environmentalist who presided over “Save Narmada” movement. | | CO1 | R | | 1 |
| 2. | Define food web. | | CO2 | U | | 1 |
| 3. | Define Biomagnification. | | CO3 | U | | 1 |
| 4. | Define Homeostasis. | | CO2 | U | | 1 |
| 5. | Name the nutrient cycle with no atmospheric source. | | CO2 | An | | 1 |
| 6. | State one International Organization for Conservation. | | CO4 | R | | 1 |
| 7. | Define “Hot Spot” of Biodiversity. | | CO4 | U | | 1 |
| 8. | Name one indoor air pollutant causing acid rain. | | CO5 | R | | 1 |
| 9. | State the year of enforcement of “Wild Life Conservation Act”. | | CO4 | R | | 1 |
| 10. | Mention the contaminant responsible for the “Minamata Bay Disease” | | CO6 | R | | 1 |
| 11. | Give one example for Natural disaster. | | CO6 | U | | 1 |
| 12. | Expand ENVIS. | | CO6 | U | | 1 |
| 13. | Name the unit of measurement of Noise. | | CO3 | R | | 1 |
| 14. | Mention the year of enactment of “The Air Pollution (Prevention) Act. | | CO5 | R | | 1 |
| 15. | Name the atmospheric layer where ozone is present. | | CO3 | R | | 1 |
| 16. | Name one index used for measurement of Biodiversity. | | CO4 | R | | 1 |
| 17. | Give one source for Ground water pollution. | | CO6 | U | | 1 |
| 18. | State whether Chernobyl Disaster is natural or man-made. | | CO6 | U | | 1 |
| 19. | Name the instrument used for measuring earthquake intensity. | | CO6 | R | | 1 |
| 20. | Mention the ecological succession which starts in a barren land ecosystem. | | CO2 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Illustrate the three types of ecological pyramids with diagram. | | CO2 | | U | 5 |
| 22. | Explain the Ecological impacts of Mining. | | CO1 | | U | 5 |
| 23. | Discuss the impacts of oil pollution in marine environment. | | CO3 | | A | 5 |
| 24. | Explain the environmental impacts of hydropower plants. | | CO1 | | U | 5 |
| 25. | Compare and contrast Conventional and Non-conventional energy resources. | | CO3 | | An | 5 |
| 26. | Explain the levels of Biodiversity. | | CO2 | | U | 5 |
| 27. | Discuss the role of NGOs in disaster management. | | CO6 | | An | 5 |
| 28. | Discuss the salient features of The Environment (Protection) Act, 1986. | | CO5 | | U | 5 |
| 29. | Differentiate Zoos and National Parks. | | CO4 | | A | 5 |
| 30. | Explain in detail Ozone Depletion and its impacts. | | CO3 | | U | 5 |
| 31. | Elaborate industrial effluent contamination with one case study. | | CO3 | | An | 5 |
| 32. | Differentiate Ocean Tidal energy and Ocean Thermal energy. | | CO1 | | An | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss the scope of Environmental Studies. | CO1 | | U | 8 |
|  | b. | Discuss the National Environmental Movements associated with River valley Projects. | CO1 | | U | 7 |
| 34. | a. | Illustrate the C and N cycle of the ecosystem with suitable diagram. | CO2 | | U | 8 |
|  | b. | Discuss the indoor and outdoor air pollution and elaborate the Bhopal Gas Tragedy. | CO3 | | A | 7 |
| 35. | a. | Discuss the Nuclear Disaster with one case study. | CO6 | | U | 8 |
|  | b. | Elaborate the Biodiversity conservation methods and strategies in India. | CO2 | | U | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Identify and distinguish the natural resources- Renewable and Non-renewable. | | | | | | | |
| CO2 | Illustrate the concepts of ecosystem and biodiversity. | | | | | | | |
| CO3 | Examine and solve environmental pollution issues. | | | | | | | |
| CO4 | Plan the conservation strategies. | | | | | | | |
| CO5 | Make use of Environmental legislation. | | | | | | | |
| CO6 | Appraise the disaster management strategies. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 1 | 25 | - | 5 | - | - | 31 |
| CO2 | | - | 28 | - | 1 | - | - | 29 |
| CO3 | | 2 | 6 | 12 | 10 | - | - | 30 |
| CO4 | | 3 | 1 | 5 | - | - | - | 9 |
| CO5 | | 2 | 5 | - | - | - | - | 7 |
| CO6 | | 2 | 12 | - | 5 | - | - | 19 |
|  | | | | | | | | **125** |

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| **Course Code** | **21AG2401** | **Duration** | **3hrs** |
| **Course Name** | **LIVESTOCK AND POULTRY MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Give an example of fodder crop. | | CO1 | U | | 1 |
| 2. | Which breed of goat produces mohair? | | CO1 | R | | 1 |
| 3. | Breed of cattle with lyre shaped horns is \_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 4. | The normal body temperature of cattle is \_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 5. | Crop is an integral part of the digestive system of \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 6. | Ranikhet disease or New Castle Disease is a highly contagious viral disease of \_\_\_\_\_\_\_\_. | | CO2 | R | | 1 |
| 7. | Period of milk production between the birth of a young calf and the next pregnancy that usually lasts about 300 days is called \_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 8. | The hormone responsible broodiness in hen is \_\_\_\_\_\_\_\_. | | CO3 | R | | 1 |
| 9. | Bluetongue disease is a viral disease of ruminants, mainly sheep that is transmitted by the insect \_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 10. | Chickens raised for meat are called broilers, while chickens raised for eggs are known as \_\_\_\_\_\_\_\_. | | CO4 | U | | 1 |
| 11. | Enterotoxemia or overeating disease or pulpy kidney disease in sheep and goats is caused by \_\_\_\_\_\_\_\_. | | CO4 | U | | 1 |
| 12. | Incubation period of a duck egg is \_\_\_\_\_\_\_\_. | | CO4 | R | | 1 |
| 13. | A metabolic disorder that occurs in cattle due to negative energy balance is \_\_\_\_\_\_\_\_. | | CO5 | R | | 1 |
| 14. | Disease caused by the bacteria *Brucellaabortus* in adult cattle is \_\_\_\_\_\_\_\_. | | CO5 | R | | 1 |
| 15. | Mastitis is the inflammation of \_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 16. | The gestation period of goat in days is \_\_\_\_\_\_\_\_. | | CO6 | R | | 1 |
| 17. | The act of parturition in cow is called \_\_\_\_\_\_\_\_. | | CO6 | U | | 1 |
| 18. | Hog cholera or Classical swine fever is a contagious viral disease of \_\_\_\_\_\_\_\_. | | CO1 | R | | 1 |
| 19. | The father of white revolution in India is \_\_\_\_\_\_\_\_. | | CO2 | U | | 1 |
| 20. | An example of Indian goat breed is \_\_\_\_\_\_\_\_. | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | What is meant by term the breed? | | CO1 | | An | 5 |
| 22. | What are the housing requirements for goats? | | CO2 | | U | 5 |
| 23. | What is Zoonosis and give 4 examples of zoonotic diseases that can be transmitted from animals to man? | | CO3 | | An | 5 |
| 24. | Explain in detail the feeding and management of pigs | | CO4 | | U | 5 |
| 25. | Differentiate Morbidity and Mortality | | CO5 | | An | 5 |
| 26. | What are the differences between indigenous and exotic breeds of cattle? | | CO6 | | U | 5 |
| 27. | What do you understand by the terms Isolation and Quarantine? | | CO1 | | An | 5 |
| 28. | Differentiate Tail-to-tail system and Head-to-head system | | CO2 | | U | 5 |
| 29. | Enlist the important characteristics of fancy chicken breeds like Frizzle, Silkie, Polish and Bantam. | | CO3 | | An | 5 |
| 30. | What is disbudding in animal husbandry? | | CO4 | | U | 5 |
| 31. | What are the six proximate principles of animal feed? | | CO5 | | An | 5 |
| 32. | Give the names of any two commercial strains of broilers and layers. | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | What is biosecurity and what are the common biosecurity measures in livestock farm? | CO5 | | A | 8 |
|  | b. | Describe the important characteristics of common pet birds like Parakeet, Cockatiel, Dove, African Grey Parrot and Finches. | CO3 | | E | 7 |
| 34. | a. | Describe the role of livestock in Integrated Farming System. | CO1 | | U | 8 |
|  | b. | Describe any 5 exotic breeds of pigs and their characteristics. | CO2 | | R | 7 |
| 35. | a. | Explain in detail the poultry hatchery operations and management. | CO3 | | A | 8 |
|  | b. | Explain in detail the two different types of intensive poultry farming. | CO5 | | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Know the importance of farm animals and its influence in rural economy. |
| CO2 | Distinguish the characteristics of indigenous and exotic breeds of cattle, goat, buffalo, swine and poultry. |
| CO3 | Select quality breeds of livestock and poultry. |
| CO4 | Choose nutritious feed rations and feeding of livestock and poultry. |
| CO5 | Set up proper housing for farm animals and poultry. |
| CO6 | Management of the common diseases of farm animals and birds. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 1 |  | 10 | 7.5 |  | 21.5 |
| CO2 | 9.5 | 12 |  |  |  |  | 21.5 |
| CO3 | 1 | 2 |  | 10 |  | 7.5 | 20.5 |
| CO4 | 1 | 13 |  |  |  |  | 14 |
| CO5 | 2 | 7.5 | 15 | 10 |  |  | 34.5 |
| CO6 | 1 | 12 |  |  |  |  | 13 |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **21AG2452** | **Duration** | **3hrs** |
| **Course Name** | **FARM MACHINERY AND POWER** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Name the device used to connect and disconnect the tractor engine from the transmission gears and drive wheels. | | CO1 | R | | 1 |
| 2. | What is the purpose the Camshaft? | | CO 1 | R | | 1 |
| 3. | What is the calorific value of petrol? | | CO1 | R | | 1 |
| 4. | List the primary tillage implements. | | CO2 | U | | 1 |
| 5. | What is the maximum power (hp) a pair of bullock can develop for doing a farm work? | | CO2 | R | | 1 |
| 6. | Name the part of IC engine which stores energy during power stroke and returns back the same energy during the idle strokes. | | CO1 | R | | 1 |
| 7. | What should be the disc angle for good plough? | | CO2 | U | | 1 |
| 8. | Define tillage. | | CO2 | R | | 1 |
| 9. | List the sources of farm power. | | CO2 | U | | 1 |
| 10. | Which was the first tractor company established in India? | | CO1 | U | | 1 |
| 11. | Name the pin used to join the connecting rod to the piston. | | CO 1 | R | | 1 |
| 12. | Name any four parts of an IC engine. | | CO 1 | U | | 1 |
| 13. | Define Tilt angle. | | CO 2 | R | | 1 |
| 14. | What is the formula to find Indicated Horse Power for four stroke engine? | | CO 1 | U | | 1 |
| 15. | Name the two types of piston rings. | | CO 1 | U | | 1 |
| 16. | Which type of tractor, otherwise called as walking type tractor? | | CO 3 | R | | 1 |
| 17. | What is the depth of ploughing of chisel plough? | | CO 2 | R | | 1 |
| 18. | What is the compression ratio of petrol engine? | | CO 1 | R | | 1 |
| 19. | What is the purpose of share in a mould board plough? | | CO 2 | U | | 1 |
| 20. | Define Stroke. | | CO 1 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Compare the merits and demerits of different forms of power(Animal, Mechanical and Electrical). | | CO1 | | An | 5 |
| 22. | Compare the working of diesel and petrol engine. | | CO3 | | U | 5 |
| 23. | Explain the working principle and basic components of hydraulic system of tractor with a neat sketch. | | CO3 | | E | 5 |
| 24. | List the advantages of using disc plough. | | CO2 | | E | 5 |
| 25 | Discuss the formulae for finding all the Variable Cost of farm machinery. | | CO1 | | E | 5 |
| 26 | Discuss the working of air cooling system. | | CO3 | | An | 5 |
| 27 | Explain the working of Carburetor. | | CO3 | | C | 5 |
| 28 | Elaborate the Power transmission system of a tractor. | | CO1 | | C | 5 |
| 29 | Compare the working of Two stroke and Four stroke IC engines. | | CO3 | | E | 5 |
| 30 | Discuss the different types of Lubrication system. | | CO1 | | C | 5 |
| 31 | Discuss the working of Chisel plough with a neat sketch. | | CO2 | | An | 5 |
| 32 | Importance of different components of IC engine. | | CO1 | | An | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Calculate BHP of a 4 stroke 4 cylinder IC engine having the following dimensions a) Cross section of piston (A)100 cm2  b) Stroke length (L) 120 mm c) Crankshaft speed (N) 1300 rpm  d) Friction horse power 22.51 hp e) Mean effective pressure  (P) 6.246 kg/cm2. | CO1 | | E | 8 |
|  | b. | Classify the cooling system and explain briefly the water cooling system. | CO3 | | R | 7 |
| 34. | a. | Discuss the formulae for finding all the Fixed Cost of farm machinery. | CO3 | | E | 8 |
|  | b. | Classify the cooling system and explain briefly the water cooling system. | CO2 | | A | 7 |
| 35. | a. | Classify the tractors based on purpose of use and explain briefly | CO1 | | An | 8 |
|  | b. | Explain in detail about the Fuel system of diesel engine. | CO3 | | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Evaluate the components of IC engine. |
| CO2 | Demonstrate the working principles and maintenance of tractor. |
| CO3 | Demonstrate the working principle of tillage equipment and inter cultivation equipment. |
| CO4 | Examine working of various sowing and planting equipment. |
| CO5 | Demonstrate the working principles of plant protection equipment. |
| CO6 | Demonstrate the working principles of harvesting and threshing equipment. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 9 | 7 | 5 | 5 | 8 | 7 | 41 |
| CO2 | 4 | 3 | 2 | 1 | - | - | 10 |
| CO3 | 5 | - | - | 5 | 4 | 3 | 17 |
| CO4 | 7 | - | 4 | 3 | 4.5 |  | 18.5 |
| CO5 | 4 | 3 | 4 | 5 | 7 | - | 23 |
| CO6 | - | - | - | - | 7 | 8.5 | 15.5 |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **21AG2551** | **Duration** | **3hrs** |
| **Course Name** | **AGRI-INFORMATICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | |
| 1. | Name the ICT initiative of ITC Limited in India with rural [farmers](https://en.wikipedia.org/wiki/Farmers) *via* internet for procurement of [agricultural](https://en.wikipedia.org/wiki/Agriculture) products. | | CO1 | R | 1 |
| 2. | What is Agricultural Technology Information Centre? | | CO3 | R | 1 |
| 3. | IVRS stands for \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 4. | Which is the independent NGO that focuses on training farmers to make and show short videos on agricultural technologies? | | CO1 | R | 1 |
| 5. | When was the Kisan Call Centres (KCC) scheme launched by the Ministry of Agriculture? | | CO1 | R | 1 |
| 6. | Define Agricultural Information System. | | CO3 | R | 1 |
| 7. | URL stands for \_\_\_\_\_\_\_\_\_\_. | | CO4 | R | 1 |
| 8. | AGRISNET \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 9. | SMS Portal was inaugurated by the Hon’ble President of India on \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 10. | GPS stands for \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | 1 |
| 11. | What is the Toll-free number of Kisan Call Centre? | | CO1 | R | 1 |
| 12. | Who is the scientist behind the experimental project “Hole in the Wall”? | | CO3 | R | 1 |
| 13. | What is anAQUA? | | CO1 | U | 1 |
| 14. | The water requirement for banana is \_\_\_\_\_\_\_\_\_\_mm. | | CO3 | R | 1 |
| 15. | What is a Green SIM? | | CO4 | U | 1 |
| 16. | UPI stand for \_\_\_\_\_\_\_\_\_\_. | | CO1 | R | 1 |
| 17. | The first expert system ever developed is \_\_\_\_\_\_\_\_\_\_. | | CO6 | R | 1 |
| 18. | Most of the Agri-Expert system are based on Rules and Knowledge representation in any expert system is in the form of \_\_\_\_\_\_\_\_\_\_. | | CO6 | R | 1 |
| 19. | Information Village Project was an ICT initiative of which non-profit organization? | | CO1 | U | 1 |
| 20. | The water requirement for maize is \_\_\_\_\_\_\_\_\_\_ mm. | | CO3 | R | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | |
| 21. | What is Agriculture Expert System? Give three examples. | | CO6 | U | 5 |
| 22. | What is Evapotranspiration? Mention different methods of its estimation. | | CO3 | U | 5 |
| 23. | What is Contingency Crop Plan? List out the weather-related contingency plan. | | CO5 | U | 5 |
| 24. | What are computer models? Mention different types of models with examples. | | CO3 | U | 5 |
| 25. | What is the Fisher Friend Mobile Advisory app? | | CO4 | U | 5 |
| 26. | Write a short note on Digital green. | | CO4 | U | 5 |
| 27. | What is ITC e-Choupal? | | CO4 | U | 5 |
| 28. | Write a short note on e-Sagu project. | | CO1 | U | 5 |
| 29. | Write a note on function of Kisan Call Centers (KCCs). | | CO1 | U | 5 |
| 30. | Describe Geographic Information System (GIS). List out the various technologies comes under GIS | | CO2 | U | 5 |
| 31. | What is Minimum Data Set? Describe various parameters of Minimum Data Sets. | | CO3 | U | 5 |
| 32. | Write a brief note on Rice Crop Manager (RCM). | | CO6 | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | What is a decision support system? | CO6 | U | 5 |
|  | b. | Give the classification of DSS according to Relationship and write the Taxonomies according to Daniel Power. | CO6 | U | 10 |
| 34. | a. | Explain Contingency Crop Plan. | CO5 | U | 3 |
|  | b. | Give a detailed explanation of different types of Contingency Crop Planning. | CO5 | A | 12 |
| 35. | a. | What is Geospatial Technology? Explain the role in Agriculture. | CO2 | U | 5 |
|  | b. | Explain different tools of Geospatial Technology. | CO2 | U | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand use of information, communication and technology (ICT) in agriculture. |
| CO2 | Demonstrate use of GIS and GPS systems in precision agriculture. |
| CO3 | Develop computerized models to understand plant growth process. |
| CO4 | Use smart phone for farm advice, farm prices and post-harvest management. |
| CO5 | Manage input requirements for crops and animals. |
| CO6 | Use Agriculture Expert system and Soil Information Systems for farm decisions. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 7 | 12 | 0 | 0 | 0 | 0 | 19 |
| CO2 | 1 | 20 | 0 | 0 | 0 | 0 | 21 |
| CO3 | 6 | 20 | 0 | 0 | 0 | 0 | 26 |
| CO4 | 1 | 16 | 0 | 0 | 0 | 0 | 17 |
| CO5 | 0 | 8 | 12 | 0 | 0 | 0 | 20 |
| CO6 | 2 | 20 | 0 | 0 | 0 | 0 | 22 |
|  | | | | | | | **125** |



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| **Coruse Code:** | **21AG3001** | **Duration :** | **3hrs** |
| **Course Name :** | **MODERN CONCEPTS IN CROP PRODUCTION** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART-A (20 X 1 =20 MARKS)** | | | | |
| 1. | Crop + Fish + Poultry/pigeon enterprises suitable for \_\_\_\_\_\_\_\_\_\_ ecosystem. | CO 5 | E | 1 |
| 2. | Calculate plant population per ha with a spacing of 20 x 10 cm. | CO 1 | C | 1 |
| 3. | Central Research Insitute for Dryland Agriculture Located at \_\_\_\_\_\_\_\_\_\_. | CO 6 | R | 1 |
| 4. | A land unit, uniform in respect of climate and length of the growing period is called as\_\_\_\_\_\_\_\_\_\_. | CO 2 | A | 1 |
| 5. | The United Nations general assembly adopted a resolution sponsored by India and declared 2023 as the International Year of \_\_\_\_\_\_\_\_\_\_. | CO 6 | R | 1 |
| 6. | Which hormone is responsible for converting glucose during the germination of seeds? | CO 4 | U | 1 |
| 7. | At harvest, the above-ground straw (leaf, sheath, and stem) wight and grain weight of the paddy crop are 5.5 and 4.5 tones per hectare respectively. What is the harvest index? | CO 1 | E | 1 |
| 8. | Which amino acid accumulates during moisture stress and is considered as a good indicator of moisture stress? | CO 4 | U | 1 |
| 9. | Which is used as a guide to planting and for determining the approximate date for harvesting crops. | CO 1 | C | 1 |
| 10. | Plants grown under water stress condition (drought) is called as \_\_\_\_\_\_\_. | CO 4 | An | 1 |
| 11. | Dormancy of weed seeds due to sudden physiological changes like water logging, low O2 pressure, etc. are called as \_\_\_\_\_\_\_\_\_. | CO 5 | A | 1 |
| 12. | ICAR – Integrated Farming System Research Institute is located at \_\_\_\_\_\_\_\_\_. | CO 5 | R | 1 |
| 13. | The unit of Net Assimilation Rate (NAR) is \_\_\_\_\_\_\_\_\_. | CO 1 | A | 1 |
| 14. | VRT and VRA are related with \_\_\_\_\_\_\_\_\_\_\_. | CO 6 | R | 1 |
| 15. | Which one is represents the maximum rate of evapotranspiration from an extended Surface of 8 to 10 cm tall green grass cover under limited supply of water?. | CO 3 | A | 1 |
| 16. | What is relative crowing co-efficient? | CO 1 | C | 1 |
| 17. | Define: Crop Modelling. | CO 6 | C | 1 |
| 18. | Define: Plant Ideotypes. | CO 6 | C | 1 |
| 19. | Define: Baule unit. | CO 3 | C | 1 |
| 20. | Expand: LER and CGR. | CO 1 | E | 1 |

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| **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | Expalin modern concept of tillage and its merits and demerits. | CO 3 | An | 5 |
| 22. | Describe in detail about the climatic factors that affect crop production. | CO 2 | C | 5 |
| 23. | Discuss on the feasibility of precision farming in Indian Agriculture. | CO 6 | E | 5 |
| 24. | Write your views on Concepts of plant population and geometry inrelation to crops and cropping system. | CO 1 | R | 5 |
| 25. | Narrate the scientific principles in crop production | CO 1 | C | 5 |
| 26. | Describe in brief about the inverse nitrogen law and Mitscherlich yield equation. | CO 1 | A | 5 |
| 27. | Briefly discuss about Factors influencing the selection, choice and size of enterprises in farming system. | CO 5 | A | 5 |
| 28. | Enumerate the weed problems in crop production and write in detail about chemical and biological weed control methods. | CO 4 | C | 5 |
| 29. | Write notes on Transition of Conventional Agriculture to Conservation Agriculture and its constraints of adaptation in India. | CO 6 | U | 5 |
| 30. | Differentiate drought adaptation and mitigation techniques in dryland agriculture. | CO 6 | A | 5 |
| 31. | As an agriculturist, how will you promote allelopathy as non-chemical weed control method and its application in sustainable weed management? | CO 4 | An | 5 |
| 32. | Give a detailed account on energy sources in crop production. | CO 4 | U | 5 |

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| **PART C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Describe the impact of GM crops in relation to cropping system provide a lucid account on the GM crop cultivation in India. | CO 6 | E | 7.5 |
| b. | Describe in detail about the concept of ideal plant type with suitable examples in cereals and pulses. | CO 6 | E | 7.5 |
| 34. | a. | Give in detail about objective and components of organic farming, its options and feasibility. | CO 5 | R | 7.5 |
| b. | Write about the concepts of INM and its application in crops and cropping system. | CO 3 | U | 7.5 |
| 35. | a. | Write about the GAP concepts and its implication, compare GAP with LEISA. | CO 5 | U | 7.5 |
| b. | Mention the Agro ecological zones of India and explain in detail of any two agro ecological zones of your choice. | CO 2 | C | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the crop production techniques and crop growth in relation to environment. |
| CO2 | Address various factors affecting crop production and yield. |
| CO3 | Know the effective ways of soil and nutrient management |
| CO4 | Recognize and identify effective ways to overcome the environmental stresses affecting crop growth and yield |
| CO5 | Learn the ways for effective utilization of farm resources, diversification of crop productions and maximizing the farm income. |
| CO6 | Gain knowledge on new technologies and trends in agriculture for maximizing crop yield and farm income in a sustainable way. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | - | 6 | - | 2 | 8 | 21 |
| CO2 | - | - | 1 | - | - | 12.5 | 13.5 |
| CO3 | - | 7.5 | 1 | 5 | - | 1 | 14.5 |
| CO4 | - | 7 | 5 | 1 | - | 5 | 18 |
| CO5 | 13.5 | 8.5 | 1 | - | - | - | 23 |
| CO6 | 3 | 5 | 5 | - | 20 | 2 | 35 |
| **Total** | | | | | | | **125** |



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| **Course Code** | **21AG3002** | **Duration :** | **3hrs** |
| **Course Name** | **PRINCIPLES AND PRACTICES OF SOIL FERTILITY AND NUTRIENT MANAGEMENT** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
|  |  | **PART-A (20 X 1 =20 MARKS)** | | | |
| 1. | What are the benefits of manuring the soil? | | CO4 | R | 1 |
| 2. | Define Soil health. | | CO1 | R | 1 |
| 3. | What do you infer by the term ‘criteria of essentiality’? | | CO2 | U | 1 |
| 4. | What is the role played by legumes in maintaining soil fertility? | | CO5 | R | 1 |
| 5. | State the Liebig’s Law of Minimum. | | CO2 | R | 1 |
| 6. | What do you understand by the term Growth? | | CO2 | R | 1 |
| 7. | Why humus colloids exhibit low negative charges? | | CO4 | U | 1 |
| 8. | State the uses of vermicompost. | | CO5 | R | 1 |
| 9. | What is Soil pH? What is the influence of pH on plant and soil? | | CO1 | R | 1 |
| 10. | What do you understand by the term ‘Luxury consumption’ ? | | CO3 | R | 1 |
| 11. | State the Nitrogen deficiency symptoms. | | CO3 | R | 1 |
| 12. | What is Aminization? | | CO6 | R | 1 |
| 13. | What is green manuring? Give examples. | | CO4 | R | 1 |
| 14. | Give the major losses of Nitrogen? | | CO3 | R | 1 |
| 15. | How will you prepare panchakavya? | | CO4 | R | 1 |
| 16. | How will you manage soil structure? | | CO1 | R | 1 |
| 17. | What are the causes of soil acidity? | | CO1 | R | 1 |
| 18. | What is Rhizosphere? Why is it considered to be important? | | CO6 | R | 1 |
| 19. | How are plant nutrients transported through mass flow? | | CO2 | R | 1 |
| 20. | State the Inverse yield - Nitrogen law. | | CO2 | R | 1 |

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|  |  | **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | What are the features of good soil management? | | CO1 | R | 5 |
| 22. | What is organic matter and what is humus? | | CO4 | R | 5 |
| 23. | What are the factors affecting nutrient availability? | | CO2 | R | 5 |
| 24. | Explain the dynamics of nutrient availability. | | CO2 | R | 5 |
| 25. | Explain the functions of nitrogen. | | CO3 | R | 5 |
| 26. | What do you infer by the term Site Specific Nutrient Management (SSNM)? Enumerate the three steps of implementing SSNM. | | CO5 | U | 5 |
| 27. | Differentiate organic fertilizers and inorganic fertilizers in term of their effectiveness. | | CO5 | U | 5 |
| 28. | Explain how does N transformation occur? | | CO3 | R | 5 |
| 29. | What are the effects of Potassium on plant growth? | | CO3 | R | 5 |
| 30. | Describe why time and method of manures and fertilizer application is important in obtaining good productivity. | | CO5 | U | 5 |
| 31. | Discuss the nutrition through foliar fertilization in meeting the nutrient requirement of a crop. | | CO6 | U | 5 |
| 32. | Define: Integrated Nutrient Management (INM). Elaborate the practices of INM. | | CO5 | R | 5 |

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|  |  | **PART C(2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | |
| 33. | a. | Differentiate the terms soil fertility and soil productivity. | CO1 | R | 7.5 |
| b. | How will you increase soil fertility? | CO1 | U | 7.5 |
| 34. | a. | In your opinion, is the organic farming concept a myth or reality? Substantiate your statement. | CO4 | U | 7.5 |
| b. | Elaborate the role of microorganisms in maintaining soil fertility under organic farming. | CO5 | U | 7.5 |
| 35. | a. | What are called as fertilizers? Write about the classification of fertilizers. | CO3 | R | 7.5 |
| b. | What are the practical approaches to increase the efficiency of fertilizers? | CO5 | A | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the importance of soil fertility management and crop growth. |
| CO2 | Know the role of various nutrients in crop growth, development and yield. |
| CO3 | Recognize the composition of various chemical fertilizers and could recognize its impact on crop production. |
| CO4 | Derive a thorough knowledge on various organic manure productions and its application. |
| CO5 | Develop a holistic knowledge on sustainable nutrient management practices for sound farming ecosystem. |
| CO6 | Learn the methodologies for determining the soil nutrient levels and the crop nutrient uptake. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 16.5 | 7.5 | - | - | - | - | 24 |
| CO2 | 14 | 1 | - | - | - | - | 15 |
| CO3 | 25.5 | - | - | - | - | - | 25.5 |
| CO4 | 8 | 8.5 | - | - | - | - | 16.5 |
| CO5 | 7 | 22.5 | 7.5 | - | - | - | 37 |
| CO6 | 2 | 5 | - | - | - | - | 07 |
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| **Course Code** | **21AG3003** | **Duration :** | **3hrs** |
| **Course Name** | **PRINCIPLES AND PRACTICES OF WEED MANAGEMENT** | **Max. Marks:** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome / Bloom’s level** | | **Marks** |
| **PART – A (20X 1.00 = 20.00 MARKS)** | | | | |
| 1. | A chemical in commercial product that is directly responsible for its herbicidal effect is called \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_. | | CO3/A | 1 |
| 2. | Seed dispersal through modified papery calyx that encloses the fruit loosely along with entrapped air is in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_weed. | | CO2/E | 1 |
| 3. | \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is one of the wheat crop associated weeds. | | CO1/ R | 1 |
| 4. | **--------------** plants are identified as weeds in the world infesting crop lands, water bodies, wood lands, gardens, orchards, airfield and utility areas. | | CO1/An | 1 |
| 5. | \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ weed has hooks as special appendages for easy dispersal through animals. | | CO2/An | 1 |
| 6. | Well grownbroad leaved weed*, Chempodium album* produces\_\_\_\_\_\_\_\_\_\_ seeds per plant. | | CO2/A | 1 |
| 7. | Weed is a plant which interferes with humans’ need and utilization of land for a specific purpose as reported by \_\_\_\_\_\_\_\_\_\_**.** | | CO1/ U | 1 |
| 8. | **-------------**is a non-selective, foliage active translocated herbicide with little persistence in soil. | | CO2/U | 1 |
| 9. | Phenoxyalkanonic acid herbicides form \_\_\_\_\_\_\_\_\_\_ per cent of all herbicides used for weed control with examples of 2,4-D and MCPA. | | CO3/R | 1 |
| 10. | Quack grass botanically known as \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is a very good soil binding plant on erodable lands, but weed in crop fields and orchards. | | CO1/ R | 1 |
| 11. | \_\_\_\_\_\_\_\_\_\_ are volatile chemicals applied into confined spaces or into the soil to produce a gas that will destroy weed seeds and act as a soil sterilant. | | CO4/An | 1 |
| 12. | In herbicide formulations, \_\_\_\_\_\_\_\_\_\_ are chemicals included to improve their herbicidal effects, sometimes marking a difference between satisfactory and unsatisfactory weed control. | | CO5/An | 1 |
| 13. | \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ is a chemical that is used to solubilize a herbicide in a concentrated form in so far as the resulting solution is soluble or miscible with water in all proportions. | | CO5/U | 1 |
| 14. | In the \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ of herbicide emulsion, each spray droplet has an oil centre, an outer layer of water, and yet another layer of oil. | | CO3/U | 1 |
| 15. | \_\_\_\_\_\_\_\_\_\_ of herbicide is done primarily to disperse the small-volume phase (concentrate) in the large volume phase (spray carrier). | | CO3/R | 1 |
| 16. | \_\_\_\_\_\_\_\_\_\_ prevent rapid drying of herbicide sprays on the foliage, thus providing an extended opportunity of herbicide absorption. | | CO5/R | 1 |
| 17. | \_\_\_\_\_\_\_\_\_\_ **a**re chemicals with such cooperative action with herbicides that the resultant phytotoxicity is more than the effects of the two working independently. | | CO4/A | 1 |
| 18. | \_\_\_\_\_\_\_\_\_\_is the movement of a herbicide from the surface into the plant body in a limited zone. | | CO5/R | 1 |
| 19. | \_\_\_\_\_\_\_\_\_\_is the transfer of a herbicide, food, or other material from one part of the plant to another. | | CO6/U | 1 |
| 20. | Shoot immobile herbicides are foliar applied herbicides that translocate only in the \_\_\_\_\_\_\_\_\_\_ direction through xylem. | | CO6/R | 1 |

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| **PART – B (10 X 5.00 = 50.00 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | What are surfactants in herbicides? Mention the types surfactants with examples. | CO5/C | 5 |
| 22. | Differentiate between selective invasions and weed succession with examples. | CO3/U | 5 |
| 23. | Define the term weeds and give examples of terrestrial and aquatic weeds. | CO2/R | 5 |
| 24. | Briefly explain about Voilure Co-Efficient (K) and Censer mechanism in weed seed dispersal with examples. | CO3/An | 5 |
| 25. | Write a note on the classification of weeds according to ontogeny (life cycle). | CO3/E | 5 |
| 26. | Explain innate dormancy and induced dormancy of weed seeds with examples. | CO3/R | 5 |
| 27. | List out the causes of weed shift and suggest ways to overcome the weed shift. | CO5/U | 5 |
| 28. | Differentiate soil applied herbicides from foliage applied herbicides with examples. | CO4/C | 5 |
| 29. | How does herbicide drift occur? Suggest ways and means control herbicide drift effects. | CO6/R | 5 |
| 30. | What do you understand about herbicide formulation? List out the different formulations of herbicide. | CO6/A | 5 |
| 31. | Differentiate noxious weeds from objectionable weeds with examples. | CO3/E | 5 |
| 32. | Briefly discuss about the triazine herbicides with examples. | CO5/A | 5 |

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| **PART – C (2 X 15.00 = 30.00 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Discuss in detail the classes of herbicides with examples. | CO6/C | 7.50 |
| b. | Explain different methods of herbicide application with examples. | CO6/A | 7.50 |
| 34. | a. | Discuss about the competitive effects of crop-weed interaction. | CO1/E | 7.50 |
| b. | Explain in detail about the allelopathic effects of crop weed interaction. | CO1/An | 7.50 |
| 35. | a. | Define herbicidal weed control. List out the advantages of herbicidal weed control in crop production. | CO5/U | 7.50 |
| b. | Explain about the biological methods of weed control and list out the ways with which biological weed control method differs from other methods. Mention the uses of biological weed control methods. | CO3/R | 7.50 |

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|  | **COURSE OUTCOMES** |
| CO1 | Identify different types of weeds and their ecosystem. |
| CO2 | Understand the weeds survival mechanisms. |
| CO3 | Recommend herbicides for weed management in field crops. |
| CO4 | Adopt different weed control methods for crop production. |
| CO5 | Apply integrated weed management practices. |
| CO6 | Workout the economics of weed control. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 1 | - | 8.5 | 7.5 | - | 19 |
| CO2 | 5 | 1 | 1 | 1 | 1 | - | 9 |
| CO3 | 14.5 | 6 | 1 | 5 | 10 | - | 36.5 |
| CO4 | - | - | 1 | 1 | - | 5 | 7 |
| CO5 | 2 | 13.5 | 5 | 1 | - | 5 | 26.5 |
| CO6 | - | 1 | 12.5 | - | - | 7.5 | 21 |
| Total | | | | | | | **121** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **21AG3004** | **Duration** | **3hrs** |
| **Course Name** | **PRINCIPLES AND PRACTICES OF WATER MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Water molecules are loosely bound together by weak \_\_\_\_\_\_\_\_\_\_ bonds, which gives water its liquid property. | | | CO1 | U | | 1 |
| 2. | An area of land where all water drains to a central point like a lake, river, or stream is known as \_\_\_\_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 3. | A productive soil contains approximately \_\_\_\_\_\_\_\_\_\_ % mineral particles, 5 % organic matter and 25 % air and 25 % water on volume basis. | | | CO1 | R | | 1 |
| 4. | Field capacity is the \_\_\_\_\_\_\_\_\_\_ limit of soil moisture available to plants. | | | CO1 | An | | 1 |
| 5. | In a normal soil with good aeration and without restrictive layers, a greater portion of roots of most plants remains within 45 to \_\_\_\_\_\_\_\_\_\_ cm surface soil layers. | | | CO2 | A | | 1 |
| 6. | Consumptive use of water is \_\_\_\_\_\_\_\_\_\_ + water used for metabolic activities of plants.. | | | CO2 | E | | 1 |
| 7. | Actual crop evapotranspiration, ETc = ETo x \_\_\_\_\_\_\_\_\_\_. | | | CO2 | An | | 1 |
| 8. | FAO \_\_\_\_\_\_\_\_\_\_-Monteith method” is the most standard method of estimating ET. | | | CO2 | U | | 1 |
| 9. | \_\_\_\_\_\_\_\_\_\_ is the cheapest source of natural water for crop growth. | | | CO3 | R | | 1 |
| 10. | \_\_\_\_\_\_\_\_\_\_irrigation requirement is net irrigation requirement/ Irrigation efficiency. | | | CO3 | A | | 1 |
| 11. | If net irrigation requirement is 500 mm and irrigation efficiency of the system is 80 %, the gross irrigation requirement is \_\_\_\_\_\_\_\_\_\_ mm. | | | CO4 | An | | 1 |
| 12. | If 5.0 cm of water is to be applied in 1.0 ha of cropped land \_\_\_\_\_\_\_\_\_\_ litres of water is needed. | | | CO5 | An | | 1 |
| 13. | Drip irrigation is the most efficient method of irrigation as about \_\_\_\_\_\_\_\_\_\_ per cent of water is actually used by plants. | | | CO3 | R | | 1 |
| 14. | \_\_\_\_\_\_\_\_\_\_irrigation is the application of water into the furrows itermittently in a series of relatively short ON and OFF times of irrigation cycle. | | | CO3 | U | | 1 |
| 15. | \_\_\_\_\_\_\_\_\_\_ is connected to the drip unit to inject dissolved fertilizers into the water in the drip unit. | | | CO5 | U | | 1 |
| 16. | \_\_\_\_\_\_\_\_\_\_irrigation system is a combination of a drip irrigation and sprinkler system. | | | CO5 | R | | 1 |
| 17. | International Water Management Institute has proposed a change of the nomenclature from ‘water use efficiency’ to ‘water \_\_\_\_\_\_\_\_\_\_. | | | CO4 | A | | 1 |
| 18. | Most important critical stage for irrigation in wheat is \_\_\_\_\_\_\_\_\_\_. | | | CO5 | R | | 1 |
| 19. | \_\_\_\_\_\_\_\_\_\_requirement is defined as the fraction of the irrigation water that must be percolated out of the bottom of the root zone in order to prevent average soil salinity from rising above some specifiable level. | | | CO6 | U | | 1 |
| 20. | Water logging is caused in a location when the inflow of water into it exceeds the outflow resulting in progressive rise of \_\_\_\_\_\_\_\_\_\_ table. | | | CO6 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Write a short note on scheduling irrigation. | | | CO2 | | C | 5 |
| 22. | Calculate the depth of irrigation (cm) in wheat crop from the following parameters. Effective root zone depth = 60 cm,  DASM allowable = 50 %, FC= 28 %, PWP = 12 %, BD = 1.35g/cm3. | | | CO3 | | E | 5 |
| 23. | Explain how irrigation is scheduled based on Epan reading. | | | CO3 | | U | 5 |
| 24. | Find out CPE for scheduling irrigation in a crop of sugarcane, if ideal IW/CPE ratio is 0.8 and IW is 40 mm. | | | CO3 | | An | 5 |
| 25. | Write a short note on furrow irrigation. | | | CO3 | | U | 5 |
| 26. | List out the advantages of drip irrigation. | | | CO3 | | R | 5 |
| 27. | Write a short note on fertigation. | | | CO5 | | U | 5 |
| 28. | Define FWUE. What are the measures to increase FWUE? | | | CO4 | | A | 5 |
| 29. | Write a short note on water management in controlled environments and polyhouses. | | | CO5 | | A | 5 |
| 30. | Explain the improvement of saline and sodic soils through water management. | | | CO6 | | A | 5 |
| 31. | Define shade house and explain its uses and water management in it. | | | CO5 | | E | 5 |
| 32. | What is the reason for salinity of water and explain the water quality class based on EC by USDA. | | | CO6 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | List out the benefits of irrigation. | CO1 | | E | 8 |
|  | | b. | Discuss scheduling irrigation based on plant indicator methods | CO1 | | An | 7 |
| 34. | | a. | Define drip fertigation. Explain the fertilizers used for drip fertigation. | CO5 | | U | 8 |
|  | | b. | Explain the advantages of drip fertigation with examples. | CO5 | | A | 7 |
| 35. | | a. | Define leaching requirement (LR). Calculate LR and total depth of water needed to meet both the crop demand and LR (AW) for a maize crop from following parameters. ECw =1.2 dS/m, ECe =2.5 dS/M, ET=800 mm. Irrigation efficiency- 75 %. Explain the results also. | CO6 | | C | 8 |
|  | | b. | What are the reasons for water logging? Explain the surface drainage methods. | CO6 | | A | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the role of water in crop production, soil moisture - forms, movement, retention, constants, water resources of India and TN. |
| CO2 | Know the water requirement of crops- its estimation, effect of moisture stress on plant growth. |
| CO3 | Study scheduling of irrigation and different methods of irrigation and their layout. |
| CO4 | Study ways to improve water use efficiency, irrigation efficiency. |
| CO5 | Understand water management practices in different crops, drip fertigation. |
| CO6 | Study quality of irrigation water, water management in problem soils and drainage of excess water from crop fields. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 1 |  | 8 | 8 |  | 19 |
| CO2 |  | 1 | 1 | 1 | 1 | 5 | 9 |
| CO3 | 7 | 11 | 1 | 5 | 5 |  | 29 |
| CO4 |  |  | 6 | 1 |  |  | 7 |
| CO5 | 2 | 14 | 12 | 1 | 5 |  | 34 |
| CO6 | 6 | 1 | 12 |  |  | 8 | 27 |
|  | | | | | | | **125** |



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| **Course Code** | **21AG3005** | **Duration** | **3hrs** |
| **Course Name** | **AGRO-METEOROLOGY AND CROP WEATHER FORECASTING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Define Agricultural meteorology. | | CO1 | U | | 1 |
| 2. | Define cardinal temperature | | CO5 | U | | 1 |
| 3. | Expand ICRISAT | | CO5 | U | | 1 |
| 4. | Define GDD | | CO5 | R | | 1 |
| 5. | Define isobars. | | CO3 | U | | 1 |
| 6. | \_\_\_\_\_\_\_\_\_ is a line drawn on a map connecting points that receive equal amounts of rainfall in a given period. | | CO3 | U | | 1 |
| 7. | If there is no atmosphere, the day temperature will be \_\_\_\_\_\_\_\_ and night temperature will be \_\_\_\_\_\_\_\_\_\_. | | CO3 | U | | 1 |
| 8. | Define ENSO. | | CO5 | R | | 1 |
| 9 | \_\_\_\_\_\_\_\_\_\_ discovered the condensation nuclei particles. | | CO3 | R | | 1 |
| 10. | The phenomenon in mountain breeze is called as \_\_\_\_\_\_\_\_ winds | | CO5 | U | | 1 |
| 11. | Land breeze occurs during \_\_\_\_\_\_\_ | | CO6 | R | | 1 |
| 12. | List any two different names of cyclone. | | CO4 | A | | 1 |
| 13. | Expand ITCZ. | | CO2 | A | | 1 |
| 14. | Define evapotranspiration. | | CO6 | R | | 1 |
| 15. | North east monsoon is also called as \_\_\_\_\_\_\_\_. | | CO4 | R | | 1 |
| 16. | Define microclimate. | | CO5 | R | | 1 |
| 17. | Define agricultural drought. | | CO2 | R | | 1 |
| 18. | List out types of weather forecasting. | | CO5 | U | | 1 |
| 19. | Write any two-weather forecasting app. | | CO5 | R | | 1 |
| 20. | Give examples of noble gases. | | CO5 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | What is agricultural meteorology and write about its scope. | | CO1 | | R | 5 |
| 22. | Explain about factors affecting weather and climate. | | CO2 | | R | 5 |
| 23. | Explain about layering of atmosphere with neat diagram. | | CO5 | | U | 5 |
| 24. | Explain the different types of drought. | | CO1 | | U | 5 |
| 25. | Explain the factors affecting evaporation. | | CO3 | | U | 5 |
| 26. | Define remote sensing and its applications in agriculture. | | CO3 | | A | 5 |
| 27. | Write short note on:   1. Ionosphere (b) Isotherm (C) Soil head flux   d) cardinal temperature (e) Quotient 10 | | CO5 | | R | 5 |
| 28. | Write about the atmospheric pressure system. | | CO4 | | U | 5 |
| 29. | Write the difference between sea breeze and land breeze with neat diagram. | | CO4 | | U | 5 |
| 30. | What is artificial rain making and explain about its merits and demerits. | | CO6 | | A | 5 |
| 31. | How to modify the microclimate for various atmospheric conditions? | | CO3 | | U | 5 |
| 32. | Explain how to manage the climate change in crop production | | Co2 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Discuss the monsoon – mechanism with neat diagram. | CO2 | | A | 7 |
|  | b. | Explain the factors affecting evapotranspiration and its significance | CO3 | | U | 8 |
|  |  |  |  | |  |  |
| 34. | a. | Explain the different types of weather forecasting and its uses in agriculture. | CO2 | | A | 7 |
|  | b. | Discuss in detail the weather hazards. | CO3 | | U | 8 |
|  |  |  |  | |  |  |
| 35. | a. | Discuss temperature inversion and its types. | CO6 | | U | 8 |
|  | b. | Explain about standard atmospheric pressure belt system. | CO3 | | U | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the significance of agricultural meteorology, climate and weather. | | | | | | | |
| CO2 | Know the various atmospheric weather variables and its significance in crop production. | | | | | | | |
| CO3 | Perceive crop weather relationships for efficient crop production. | | | | | | | |
| CO4 | Acquire knowledge on weather forecasting techniques. | | | | | | | |
| CO5 | Gains hands-on knowledge on the functioning of agro-meteorological observatory. | | | | | | | |
| CO6 | Address the effect of climate change on crop production. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 5 | 6 | - | - | - | - | 11 |
| CO2 | | 7 | 5 | 14 | - | - | - | 26 |
| CO3 | | 1 | 36 | 5 | - | - | - | 42 |
| CO4 | | 1 | 10 | 1 | - | - | - | 12 |
| CO5 | | 9 | 10 | - | - | - | - | 19 |
| CO6 | | 2 | 8 | 5 | - | - | - | 15 |
|  | | | | | | | | **125** |



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| **Course Code:** | **21AG3006** | **Duration :** | **3hrs** |
| **Course Name:** | **CROPPING SYSTEMS AND SUSTAINABLE AGRICULTURE** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART-A (20 X 1 =20 MARKS)** | | | | |
| 1. | Producing sufficient food to meet the need of the present generation without eroding the ecological balance and supporting future generations is called \_\_\_\_\_\_\_\_\_\_. | CO 2 | E | 1 |
| 2. | The cropping system which has more area in India is\_\_\_\_\_\_\_\_\_\_.  A. Rice -Rice B. Rice – Wheat C. Maize – Rice D. Wheat – Maize | CO 3 | A | 1 |
| 3. | Yearly sequence and spatial arrangements of crops and fallow onin given area refers to \_\_\_\_\_\_\_\_\_\_\_. | CO 5 | R | 1 |
| 4. | System of farming on particular farm which includes crop production, raising, livestock, poultry, bee keeping etc and sustain and satisfy as many needs of the farmers is known as \_\_\_\_\_\_\_\_\_\_. | CO 4 | C | 1 |
| 5. | Black gram/Green gram + Maize cropping system is example of \_\_\_\_\_\_\_\_\_. | CO 2 | A | 1 |
| 6. | Sugarcane +Mustard +Onion/Potato intercropping comes under \_\_\_\_\_\_\_\_\_\_ cropping system. | CO 4 | An | 1 |
| 7. | Which type of intercropping series prevalent in India? | CO 5 | E | 1 |
| 8. | Mixed cropping commonly used in \_\_\_\_\_\_\_\_\_\_ areas. | CO 3 | C | 1 |
| 9. | Succeeding crops planted before harvesting the proceeding crops is known as \_\_\_\_\_\_. | CO 6 | E | 1 |
| 10. | Paira and Utera cropping is example of \_\_\_\_\_\_\_\_\_\_\_\_-. | CO 1 | A | 1 |
| 11. | The process of carbon capture and the long-term storage of atmospheric carbon dioxide or other forms of carbon to mitigate global warming is termed as \_\_\_\_\_\_\_\_\_ | CO 3 | R | 1 |
| 12. | In a cropping sequence of Maize – Wheat – Green gram the cropping intensity should be\_\_\_\_\_\_\_\_\_\_\_\_ | CO 1 | C | 1 |
| 13. | Recommended Alley width in Alley cropping is at least\_\_\_\_\_\_\_\_\_\_. | CO 2 | An | 1 |
| 14. | The ratio of land required by pure crop to produce the same yield as that of intercrop is known as \_\_\_\_\_\_\_\_\_\_. | CO 3 | R | 1 |
| 15. | Ratio of relative crowding coefficient of any given species in the mixture is known as \_\_\_\_\_\_\_\_\_\_. | CO 4 | A | 1 |
| 16. | Multiple cropping index was proposed by \_\_\_\_\_\_\_\_\_\_. | CO 3 | R | 1 |
| 17. | Define: Allelopathy. | CO 5 | U | 1 |
| 18. | Define: Relay cropping. | CO 4 | U | 1 |
| 19. | Expand: CII and LUE. | CO 1 | C | 1 |
| 20. | Expand: CEY and HDI. | CO 1 | C | 1 |

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| **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | Write an account of the application of growth regulator and its role in sustainable agriculture. | CO 4 | R | 5 |
| 22. | Enlist the factors governing choice and size of enterprises in farming system. | CO 2 | C | 5 |
| 23. | Describe soil fertility management and fertilizer use in cropping system. | CO 1 | E | 5 |
| 24. | Discuss in detail about concepts and principles of LEISA. | CO 3 | A | 5 |
| 25. | Explain the labour management in crop production. | CO 5 | An | 5 |
| 26. | Do you think Organic Agriculture is possible in population burgeoning countries like India? Justify your statement. | CO 6 | R | 5 |
| 27. | Discuss modern concepts of tillage including zero tillage, minimum tillage and conservation tillage. | CO 3 | U | 5 |
| 28. | If farmers residing in rainfed area approaches you, what remedies will you suggest for increasing the fertilizer use efficiency (FUE)? | CO 6 | C | 5 |
| 29. | Elaborate the basic soil properties that influence the soil moisture conservation in rainfed based cropping system. | CO 2 | An | 5 |
| 30. | Describe crop rotation and its impact on sustainable agriculture. | CO 5 | A | 5 |
| 31. | What do you understand about diversity? Address the need of crop diversity for sustainable agriculture. | CO 5 | C | 5 |
| 32. | Brief the tillage and land shaping technique in cropping system. | CO 1 | A | 5 |

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| **PART C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Explain a wetland integrated farming system model in 1 ha area for western zone of Tamil Nadu and its recycling potential. | CO 2 | E | 7.5 |
| b. | Explain the need and principles of cropping and farming system research. | CO 1 | E | 7.5 |
| 34. | a. | Write in detail about crop residue management and constraints of Conservation agriculture adaptation in India. | CO 6 | R | 7.5 |
| b. | As an agriculturist, how will you promote allelopathy as non-chemical weed control method and its application in sustainable weed management? | CO 4 | A | 7.5 |
| 35. | a. | Enlist the criteria for selecting crops and varieties in multitier cropping system. | CO 3 | R | 7.5 |
| b. | What is mean by ALUS and discuss about ley farming and alley farming? | CO 5 | C | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand different cropping systems and ways to effectively manage resources under different cropping systems. |
| CO2 | Develop deep insights on crop interactions under cropping systems. |
| CO3 | Gain knowledge on the importance of sustainable agriculture. |
| CO4 | Relate sustainable agriculture with conventional agriculture in a scientific manner. |
| CO5 | Imbibe knowledge on the importance of crop diversification and the sustainability of farm operations. |
| CO6 | Apply the knowledge of sustainable crop production in effectively guiding farmers. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  | 6 |  | 12.5 | 2 | 20.5 |
| CO2 |  | 5 | 1 | 5 | 6.5 | 5 | 22.5 |
| CO3 | 9.5 | 5 | 6 |  |  | 1 | 21.5 |
| CO4 | 5 | 1 | 8.5 | 1 |  | 1 | 16.5 |
| CO5 | 1 | 1 | 5 | 5 | 1 | 12.5 | 25.5 |
| CO6 | 12.5 |  |  |  | 1 | 5 | 18.5 |
|  | | | | | | | **125** |

**Graphical user interface, application

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| **Course Code** | **21AG3008** | **Duration** | **3hrs** |
| **Course Name** | **AGRONOMY OF MAJOR CEREALS AND PULSES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | | **Bloom’s Level** | | | **Marks** | |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | | | |
| 1. | The cultivated *Oryza sativa* has three sub species of which \_\_\_\_\_\_\_\_\_\_\_\_\_ is the widely grown sub species in many rice growing countries. | | | CO3 | | R | | | 1 |
| 2. | \_\_\_\_\_\_\_\_\_\_\_\_ is a variety of rice (*Oryza sativa*) which is produced through genetic engineering to biosynthesize beta-carotene, a precursor of vitamin A | | | CO1 | | R | | | 1 |
| 3. | \_\_\_\_\_\_\_\_\_\_\_ cropis known as "Queen of Cereals". | | | CO6 | | R | | | 1 |
| 4. | \_\_\_\_\_\_\_\_\_\_ is responsible for the unique elasticity and stickiness of wheat dough, which makes it so useful in bread making. | | | CO1 | | R | | | 1 |
| 5. | *Pseudomonas fluorescens*is a \_\_\_\_\_\_\_\_\_\_\_ | | | CO6 | | R | | | 1 |
| 6. | \_\_\_\_\_\_\_\_\_ tonnes of FYM /ha is recommended for field preparation before last ploughing. | | | CO5 | | R | | | 1 |
| 7. | *Phalaris minor* and wild oat are major weeds in \_\_\_\_\_\_\_\_\_ crop. | | | CO2 | | An | | | 1 |
| 8. | *Zea mays everta*is known as \_\_\_\_\_\_\_\_ | | | CO1 | | R | | | 1 |
| 9. | International Rice Research Station (IRRI) is located in \_\_\_\_\_\_\_ | | | CO1 | | R | | | 1 |
| 10. | \_\_\_\_\_\_\_\_\_ is the appropriate time for pulling out the paddy seedlings from the nursery for the transplanted puddled lowland rice. | | | CO3 | | A | | | 1 |
| 11. | Soybean has \_\_\_\_\_\_\_ % of protein and \_\_\_\_\_\_\_ % oil. | | | CO6 | | R | | | 1 |
| 12. | \_\_\_\_\_\_\_\_ is called as a “WONDER CROP”. | | | CO4 | | R | | | 1 |
| 13. | \_\_\_\_\_\_\_\_\_\_ is the wet cultivation of land that mixes the soil and water to produce an impervious layer. It is achieved by ploughing the flooded soil and harrowing it at progressively lower water contents. | | | CO3 | | R | | | 1 |
| 14. | The male flower on a corn plant is called as \_\_\_\_\_\_\_\_. | | | CO6 | | An | | | 1 |
| 15. | Before pulling the paddy seedlings from the nursery, application of \_\_\_\_\_\_\_\_\_\_ is recommended to prevent root snapping problem. | | | CO6 | | A | | | 1 |
| 16. | \_\_\_\_\_\_\_\_\_\_\_\_\_ is the first stage of rice plant,that is an indication for rice crop entering into reproductive state. | | | CO5 | | R | | | 1 |
| 17. | What is the recommended seed rate for SRI method of paddy cultivation? | | | CO3 | | An | | | 1 |
| 18. | The International Maize and Wheat Improvement Center (CIMMYT)islocated in \_\_\_\_\_\_\_\_\_. | | | CO1 | | R | | | 1 |
| 19. | The primary centre of origin of maize is considered as the \_\_\_\_\_\_\_\_\_. | | | CO3 | | A | | | 1 |
| 20. | What is the botanical name for finger millet? | | | CO1 | | R | | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | | | |
| 21. | What are the seed treatment procedures which are followed for pulse crops by .using fungicides, biocontrol agents and biofertilizers? | | | CO4 | | | U | | 5 |
| 22. | Write short note on the water management practices followed for transplanted puddled lowland rice. | | | CO2 | | | An | | 5 |
| 23. | Write a short note on SRI method of paddy cultivation. | | | CO3 | | | E | | 5 |
| 24. | Write a brief note on aflatoxins in redgram. | | | CO6 | | | U | | 5 |
| 25. | What are the two types of chickpea that are cultivated in India and describe their characteristics? | | | CO1 | | | A | | 5 |
| 26. | Write a short note on deep water rice. | | | CO2 | | | E | | 5 |
| 27. | What are the advantages of cultivating transplanted sorghum? | | | CO6 | | | A | | 5 |
| 28. | Elaborate in the use of conoweeder in SRI method of paddy cultivation | | | CO6 | | | A | | 5 |
| 29. | Write about sorghum poisoning. | | | CO1 | | | E | | 5 |
| 30. | Write briefly about the Ratoon Sorghum crop management. | | | CO6 | | | R | | 5 |
| 31. | What is LCC? Explain in detail about N management through LCC for paddy. | | | CO3 | | | A | | 5 |
| 32. | Write briefly about the Nitrate poisoning in maize. | | | CO2 | | | A | | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | | | |
| 33. | a. | What are the different types of maize and briefly explain about each of their characteristics? | | CO1 | | | R | | 7.5 |
|  | b. | What is transgenic rice? Explain in detail about different transgenic rice varieties available. | | CO3 | | | A | | 7.5 |
| 34. | a. | Explain in detail about the manures & fertilizer management, weed management and Irrigation management in Sorghum. | | CO3 | | | An | | 7.5 |
|  | b. | Explain in detail the cultivation practices for Irrigated Maize from sowing to harvest? | | CO5 | | | A | | 7.5 |
| 35. | a. | Narrate about the origin, geographic distribution, Economic Importance, and cultivation aspects of oats. | | CO1 | | | A | | 7.5 |
|  | b. | Describe the agro-climatic zones of wheat in India. | | CO1 | | | R | | 7.5 |

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| **COURSE OUTCOMES** | |
| CO1 | Understand the geographical distribution, varietal improvements and the adaptability of major cereals and pulses cultivated in India. |
| CO2 | Acquire knowledge on crop production technologies for rabi cereals. |
| CO3 | Perceive knowledge on crop production technologies for kharif cereals. |
| CO4 | Manage the crop production technologies for rabi pulses. |
| CO5 | Work out the crop production technologies for kharif pulses. |
| CO6 | Apply the acquired knowledge to guide the farmers for cultivating cereals and pulses. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 21 |  | 12.5 |  | 5 |  | 38.5 |
| CO2 |  |  | 5 | 6 | 5 |  | 16 |
| CO3 | 2 |  | 14.5 | 8.5 | 5 |  | 30 |
| CO4 | 1 | 5 |  |  |  |  | 6 |
| CO5 | 2 |  | 7.5 |  |  |  | 9.5 |
| CO6 | 8 | 5 | 11 | 1 |  |  | 25 |
|  | | | | | | | **125** |



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| **Course Code** | **21AG3009** | **Duration** | **3hrs** |
| **Course Name** | **AGRONOMY OF OILSEED, FIBER, AND SUGAR CROPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Name the state which produces the maximum mustard. | | | CO1 | U | | 1 |
| 2. | What is the oil content in linseed? | | | CO1 | R | | 1 |
| 3. | Name the state which has the maximum area under groundnut. | | | CO1 | R | | 1 |
| 4. | Name the chemical used for seed hardening in groundnut. | | | CO2 | R | | 1 |
| 5. | How much gypsum should be applied to peanuts? | | | CO2 | U | | 1 |
| 6. | Name the fruit of rapeseed and mustard. | | | CO2 | R | | 1 |
| 7. | Name the cotton fruit. | | | CO3 | U | | 1 |
| 8. | Define high-density planting in cotton. | | | CO3 | R | | 1 |
| 9. | What is linen fabric? | | | CO3 | U | | 1 |
| 10. | What is the optimum water pH for retting? | | | CO4 | U | | 1 |
| 11. | Who is called the father of hybrid cotton? | | | CO4 | U | | 1 |
| 12. | What is harrowing in sugarcane? | | | CO4 | R | | 1 |
| 13. | Name the noble cane varieties. | | | CO5 | R | | 1 |
| 14. | What is a sod crop? | | | CO5 | R | | 1 |
| 15. | What is retting in jute? | | | CO6 | U | | 1 |
| 16. | Write the uses of sun hemp. | | | CO6 | R | | 1 |
| 17. | What are the hybrids of sugar beet suitable for cultivation in Tamilnadu? | | | CO6 | U | | 1 |
| 18. | Enumerate the good qualities of sugarcane. | | | CO1 | R | | 1 |
| 19. | What is ratooning in sugarcane? | | | CO2 | U | | 1 |
| 20. | What is detracting in sugarcane? | | | CO4 | U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Tabulate the differences between sympodia and non-sympodial branches in cotton. | | | CO1 | | An | 5 |
| 22. | List out important steps in sugarcane ratoon management. | | | CO2 | | U | 5 |
| 23. | Mention the problems in sunflower cultivation in India | | | CO3 | | An | 5 |
| 24. | Why is color cotton not popular in India? | | | CO4 | | U | 5 |
| 25. | Write the important castor hybrids and its importance. | | | CO5 | | An | 5 |
| 26. | Write the differences between the sugarcane and sugarbeet. | | | CO6 | | U | 5 |
| 27. | Write the different methods of sugarcane planting. | | | CO1 | | An | 5 |
| 28. | What is crop logging? How it is useful in enhancing the sugarcane yield? | | | CO2 | | U | 5 |
| 29. | Write the importance of white seeded sesamum. | | | CO3 | | An | 5 |
| 30. | Write different varieties of sugarbeet. | | | CO4 | | U | 5 |
| 31. | Calculate the quantity of oil, and income with the data Pod yield 2500kg, shelling percent 60 and cost of oil Rs.250/kg | | | CO5 | | An | 5 |
| 32. | What are aflatoxin and its management measures? | | | CO6 | | U | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | How to increase oil seed production in India? | CO1 | | U | 7.5 |
|  | | b. | How can we enhance the ratoon sugarcane yield? | CO3 | | A | 7.5 |
|  | |  |  |  | |  |  |
| 34. | | a. | Give in detail about methods of sugarcane planting. | CO2 | | U | 7.5 |
|  | | b. | List out the different byproducts of sugarcane. | CO3 | | R | 7.5 |
|  | |  |  |  | |  |  |
| 35. | | a. | Bt cotton is a boom for farmers. Explain with scientific reasons. | CO3 | | U | 7.5 |
|  | | b. | Enumerate the importance of sesame. | CO2 | | U | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the geographical distribution, varietal improvements, and adaptability of major oilseed, fiber, and sugar crops cultivated in India |
| CO2 | Acquire knowledge of crop production technologies for rabi oilseeds |
| CO3 | Practice on crop production technologies for kharif oilseeds |
| CO4 | Implement crop production technologies for fiber crops |
| CO5 | Work out crop production technologies for sugar crops |
| CO6 | Apply the acquired knowledge to guide the farmers in cultivating oilseed, fiber, and sugar crops |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 3 | 8.5 | - | 10 | - | - | 21.5 |
| CO2 | 2 | 26 | - | - | - | - | 28.0 |
| CO3 | 8.5 | 9.5 | 7.5 | 10 | - | - | 36.5 |
| CO4 | 1 | 13 | - | - | - | - | 14.0 |
| CO5 | 2 | - | - | 10 | - | - | 12.0 |
| CO6 | 1 | 12 | - | - | - | - | 13.0 |
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| **Course Code** | **21AG3033** | **Duration :** | **3hrs** |
| **Course Name** | **BIOTECHNOLOGY FOR CROP IMPROVEMENT** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome / Bloom’s Level** | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | |
| 1. | Auxin was discovered by \_\_\_\_\_\_\_\_. | CO1 / R | 1 |
| 2. | Initial development of haploids through anther and pollen culture was performed by \_\_\_\_\_\_\_\_. | CO1 / R | 1 |
| 3. | The phenomenon of conversion of mature cells into meristematic state leading to the formation of callus is known as \_\_\_\_\_\_\_\_. | CO1 / R | 1 |
| 4. | What is molecular pharming and where is it used? | CO1 / R | 1 |
| 5. | NAA and 2,4-D is a type of cytokinin in plant growth regulator (True/False) | CO2 / R | 1 |
| 6. | The molecules which stimulate the production of secondary metabolites is known as elicitors (True/False). | CO2 / R | 1 |
| 7. | The development of non-zygotic embryos from single/group of cells is called as \_\_\_\_\_\_\_\_. | CO2 / R | 1 |
| 8. | \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_ proposed the term somaclone | CO2 / R | 1 |
| 9. | ELISA technique was originally developed for the detection of virus (True/False) | CO1 / R | 1 |
| 10. | The role of EDTA in DNA isolation is \_\_\_\_\_\_\_\_. | CO3/ R | 1 |
| 11. | Which culture of plants is popularly known to produce virus free plants? | CO3/ R | 1 |
| 12. | The Headquarters of NCBI is located in \_\_\_\_\_\_\_\_. | CO3/ R | 1 |
| 13. | Mention few examples of dominant molecular markers? | CO5/ R | 1 |
| 14. | What is Bulk Segregant analysis? | CO5/R | 1 |
| 15. | Embryo rescue is a technique followed with culturing of fertilized embryos to prevent embryo abortion in wild crosses. (True/False) | CO5/R | 1 |
| 16. | Microinjection is a physical method adopted in genetic transformation (True/False) | CO2/ R | 1 |
| 17. | Cry gene is isolated from the bacteria \_\_\_\_\_\_\_\_. | CO2/R | 1 |
| 18. | The shelf life of tomato was increased by silencing polygalactronase gene with \_\_\_\_\_\_\_\_ technology. | CO6/R | 1 |
| 19. | Recombinant inbred lines are the lines that are completely uniform except for one trait (True/False) | CO6/R | 1 |
| 20. | The Indian natural permafrost is located at \_\_\_\_\_\_\_\_. | CO6/R | 1 |

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| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Briefly write about the DNA extraction protocol followed in crops. | CO3 / A | 5 |
| 22. | Explain about the marker assisted back cross and mention its advantages in plant breeding programs. | CO2 / U | 5 |
| 23. | What are NIL’s and how are they developed? | CO3 / A | 5 |
| 24. | Write about the anther culture and its advantages. | CO3/ An | 5 |
| 25. | What is genetic engineering male sterility and explain about Barnase/Barstar system? | CO5 / A | 5 |
| 26. | Briefly explain about the sterilization techniques and its types. | CO4 / R | 5 |
| 27. | What is somatic embryogenesis and mention its classification? | CO1 / A | 5 |
| 28. | Write a short note on Nano-biotechnology and its applications in Plant Biotechnological techniques with examples. | CO2 / A | 5 |
| 29. | What is GUS assay and mention its applications. | CO3/ An | 5 |
| 30. | Briefly write about GISH and FISH. | CO6 / A | 5 |
| 31. | Explain about the classification of markers used in plant breeding. | CO1 /An | 5 |
| 32. | What is BLAST? Briefly write about the various plant genomic databases. | CO4 /A | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Write about the different components of a Media and describe about the various kinds of media used in tissue culture techniques. | CO5 / U | 10 |
| b. | Briefly write on the steps followed in ovule culture of plants | CO5 / U | 5 |
| 34. | a. | What is recombinant DNA technology and mention about the classification of vectors used? | CO5 /U | 4 |
| b. | Elaborate the different genetic transformation methods with diagrams. | CO5 / U | 8 |
|  | c. | Mention the biosafety issues faced in the release of transgenics. | CO5 / U | 3 |
| 35. | a. | What is Association mapping and linkage disequilibrium? Explain about the procedures involved in QTL mapping. | CO2 / E | 8 |
| b. | Elaborate the different types of mapping population used in marker assisted breeding techniques. Also mention about their advantages. | CO2 / E | 7 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Do micropropagation in crop plants. | | | | | | | |
| CO2 | Understand the quantification and quality assessment of plant genomic DNA. | | | | | | | |
| CO3 | Practice the vector based cloning techniques. | | | | | | | |
| CO4 | Apply their knowledge on mapping and tagging of agronomically important traits. | | | | | | | |
| CO5 | Transfer foreign genes into plants through rapid introgression methods. | | | | | | | |
| CO6 | Gain knowledge on legal and ethical views about GMO’s. | | | | | | | |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 5 |  | 5 | 5 |  |  | 15 |
| CO2 | | 6 | 5 | 5 |  | 15 |  | 31 |
| CO3 | | 3 |  | 10 | 10 |  |  | 23 |
| CO4 | | 5 |  | 5 |  |  |  | 10 |
| CO5 | | 3 | 30 | 5 |  |  |  | 38 |
| CO6 | | 3 |  | 5 |  |  |  | 8 |
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| **Course Code** | **21AG3214** | **Duration:** | **3hrs** |
| **Course Name** | **PLANT BIOCHEMISTRY** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome / Bloom’s Level** | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | |
| 1. | The process of breakdown of fattyacid by removal of two carbon in each step is called as \_\_\_\_\_\_\_\_\_\_. | CO2/R | 1 |
| 2. | List any one osmoprotectant. | CO4/R | 1 |
| 3. | Give an example of growth promoter. | CO5/R | 1 |
| 4. | Name the organelles involved in ATP synthesis. | CO1/R | 1 |
| 5. | Which is called the stress hormone? | CO4/R | 1 |
| 6. | The layer of cells surrounding the vascular bundle in C4 plant is called as \_\_\_\_\_\_\_\_\_\_. | CO1/R | 1 |
| 7. | Name the start codon. | CO4/R | 1 |
| 8. | The protein which gives heat tolerance is \_\_\_\_\_\_\_\_\_\_. | CO4/R | 1 |
| 9. | The proteins which receive the signals at the cell surface is \_\_\_\_\_\_\_\_\_\_. | CO4/R | 1 |
| 10. | \_\_\_\_\_\_\_\_\_\_ is involved in plant defense mechanism against pathogens. | CO6/R | 1 |
| 11. | Expand SOS. | CO4/R | 1 |
| 12. | List an ethylene biosynthetic inhibitor. | CO3/R | 1 |
| 13. | Give an example of accessory pigment. | CO1/R | 1 |
| 14. | \_\_\_\_\_\_\_\_\_\_ is the source of ROS in the photosynthesis. | CO4/R | 1 |
| 15. | \_\_\_\_\_\_\_\_\_\_ is the fundamental and structural unit of an organism. | CO1/R | 1 |
| 16. | Which is the site of C3 cycle? | CO1/R | 1 |
| 17. | Synthesis of sugars from non-carbohydrate carbon sources is called as \_\_\_\_\_\_\_\_\_\_. | CO2/R | 1 |
| 18. | Name the hormone which is applied to produce female flowers. | CO5/R | 1 |
| 19. | The process of completion of life cycle before drought is called as \_\_\_\_\_\_\_\_\_\_. | CO4/R | 1 |
| 20. | Name the enzyme which is activated by GA. | CO3/R | 1 |

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| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | What are the different types of receptors? Explain GPCRs. | CO4/R | 5 |
| 22. | Discuss the mechanism of photosynthesis in CAM plants. | CO1/U | 5 |
| 23. | Explain the different drought adaptation mechanisms in plants. | CO4/U | 5 |
| 24. | Draw a neat labelled diagram of Chloroplast. Mention the function of these organelles. | CO1/R | 5 |
| 25. | Differentiate C3 and C4 plants. | CO1/An | 5 |
| 26. | Describe the Auxin biosynthetic pathway and its major physiological functions. | CO3/U | 5 |
| 27. | Discuss the plant defense mechanism against pathogens. | CO6/U | 5 |
| 28. | Write in detail the biological nitrogen fixation. | CO2/ R | 5 |
| 29. | Explain the steps in ethylene biosynthetic pathway. | CO3/U | 5 |
| 30. | Describe the biochemical changes during seed germination. | CO2/U | 5 |
| 31. | Classify the alkaloids with an example for each group and their use. | CO5/U | 5 |
| 32. | Describe the mode of action of Heat Shock Proteins under temperature stress | CO4/U | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. |  | Explain the different stress tolerance mechanism under salt stress | CO 4/ U | 15 |
|  |  |  |  |  |
| 34. |  | Explain the light and dark reactions of C3 Photosynthesis. | CO1/ U | 15 |
|  |  |  |  |  |
| 35. |  | Discuss in detail the GA biosynthesis in plants and its mode of action in seed germination. | CO3/ U | 15 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the biochemistry of plant photosynthesis. |
| CO2 | Remember the biosynthesis of plant biomolecules. |
| CO3 | Understand the biochemistry of plant developmental processes. |
| CO4 | Explain the biochemistry of stress mechanisms in plant system. |
| CO5 | Describe the synthesis of secondary metabolites in plant system. |
| CO6 | Discuss defense mechanisms in plant system. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 | 20 | - | 5 | - | - | 35 |
| CO2 | 7 | 5 | - | - | - | - | 12 |
| CO3 | 2 | 25 | - | - | - | - | 27 |
| CO4 | 8 | 30 | - | - | - | - | 38 |
| CO5 | 2 | 5 | - | - | - | - | 7 |
| CO6 | 1 | 5 | - | - | - | - | 6 |
|  | | | | | | | **125** |

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| **Course Code:** | **21AG3215** | **Duration :** | **3hrs** |
| **Course Name:** | **PRINCIPLES OF PLANT PHYSIOLOGY** | **Max. Marks:** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | | |
| 1. | Framework elements are \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO4 | R | 1 |
| 2. | There is no deficiency symptom in plant even with low level of nutrient is called as \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO4 | U | 1 |
| 3. | Mention the different type of transpiration? | CO3 | R | 1 |
| 4. | Sudden decrease in quantum yield when wavelength is greater than 680 nm is called as \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO5 | U | 1 |
| 5. | \_\_\_\_\_\_\_\_\_\_\_\_\_ photo system involves both in cyclic and non cyclic photo phosphorylation | CO5 | R | 1 |
| 6. | \_\_\_\_\_\_\_\_\_\_\_\_\_ soil is having high water holding capacity | CO2 | R | 1 |
| 7. | Hen and chicks in grapes due to \_\_\_\_\_\_\_\_\_\_\_\_\_ | CO4 | A | 1 |
| 8. | Define: Vernalization. | CO6 | R | 1 |
| 9. | Dimorphic chloroplast present in \_\_\_\_\_\_\_\_\_\_\_\_\_ plants. | CO1 | R | 1 |
| 10. | Which organelle is the control center of the cell? | CO1 | U | 1 |
| 11. | Ions can be dissolved in soil solution in \_\_\_\_\_\_\_\_\_\_\_\_\_ theory. | CO2 | R | 1 |
| 12. | Passive absorption of water due to the role of \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO2 | U | 1 |
| 13. | Photolysis of water take place in \_\_\_\_\_\_\_\_\_\_\_\_\_ photosystem. | CO5 | R | 1 |
| 14. | The entry of CO2 into stomata is an example for \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO3 | U | 1 |
| 15. | Site of photorespiration \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO1 | R | 1 |
| 16. | Hypotonic solution is \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO2 | R | 1 |
| 17. | Which parts of root is involved in absorption of water in higher plants? | CO2 | An | 1 |
| 18. | Khaira of paddy caused by \_\_\_\_\_\_\_\_\_\_\_\_\_. | CO2 | A | 1 |
| 19. | Which organelle helps plant cells make food? | CO4 | R | 1 |
| 20. | Calvin cycle take place in \_\_\_\_\_\_\_\_\_\_\_\_\_ cell in C3 plants and \_\_\_\_\_\_\_\_\_\_\_\_\_ cell in C4 plants. | CO5 | R | 1 |

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| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | Give an account of vernalization and mention its significance. | CO6 | R | 5 |
| 22. | Discuss the water relations of a plant cell. | CO2 | U | 5 |
| 23. | Describe cyclic and non cyclic electron transport and photo phosphorylation. | CO5 | An | 5 |
| 24. | Comment briefly on mechanism of stomatal movement. | CO3 | U | 5 |
| 25. | What is transpiration? Discuss its significance in plant life? | CO3 | R | 5 |
| 26. | Explain what is meant by active and passive absorption of water in plants. | CO3 | A | 5 |
| 27. | Explain mitochondrial electron transport chain. | CO5 | U | 5 |
| 28. | Explain the mechanism of entry of water in plants. | CO2 | An | 5 |
| 29. | Describe the relationship between ascent of sap and transpiration in plants. | CO3 | U | 5 |
| 30. | Write in detail about Calvin cycle pathway with schematic diagram. | CO5 | U | 5 |
| 31. | Differentiate between Tropic movement and Nastic movement. | CO6 | R | 5 |
| 32. | Differentiate between C3 plants and C4 plants. | CO5 | U | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Enumerate major and minor elements in plant nutrition and briefly explain their role in plants. | CO4 | R | 8 |
| b. | Comment briefly on glycolysis and its significance in the mechanism of respiration. | CO5 | E | 7 |
| 34. | a. | Write a critical account on physiology of flowering. | CO6 | U | 8 |
| 35. | b. | Explain the mechanism of carbon fixation in CAM plants. | CO5 | U | 7 |
| a. | Write an essay on biosynthesis of plant growth hormones. Discuss their role in growth and development of plants with suitable examples. | CO5 | A | 8 |
|  | b. | What is stress? Give a brief account of water stress in plants. | CO3 | U | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Explain about the physiological functions of cell organelles. |
| CO2 | Discuss about the relationship between soil, water and plant. |
| CO3 | Explain about the stomatal function, transpiration and water stress in plants. |
| CO4 | Describe the role of various growth regulators on plant growth. |
| CO5 | Describe about the photosynthesis and photorespiration. |
| CO6 | Explain about the physiology of flowering and plant movements. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 1 | - | - | - | - | 3 |
| CO2 | 3 | 6 | 1 | 6 | - | - | 16 |
| CO3 | 6 | 18 | 5 | - | - | - | 29 |
| CO4 | 10 | 1 | 1 | - | - | - | 12 |
| CO5 | 3 | 23 | 8 | 5 | 7 | - | 46 |
| CO6 | 11 | 8 | - | - | - | - | 19 |
|  | | | | | | | **125** |

**Graphical user interface, application

Description automatically generated with medium confidence**

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| **Course Code** | **21AG3217** | **Duration** | **3hrs** |
| **Course Name** | **EXPERIMENTAL DESIGNS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Who is the father of modern statistics? | | CO1 | R | | 1 |
| 2. | What is an experiment? | | CO1 | U | | 1 |
| 3. | Name any two principle of an experimental design. | | CO2 | R | | 1 |
| 4. | Define replication. | | CO2 | R | | 1 |
| 5. | Write the sources of variation in CRD. | | CO3 | R | | 1 |
| 6. | What could be the appropriate condition to adopt CRD? | | CO3 | R | | 1 |
| 7. | What is the general formula to calculate mean sum of squares? | | CO2 | U | | 1 |
| 8. | What is a contrast? | | CO2 | R | | 1 |
| 9. | What is blocking? | | CO2 | R | | 1 |
| 10. | What is the formula for SE(d) in RCBD? | | CO2 | R | | 1 |
| 11. | Write any one property of Latin square design. | | CO2 | U | | 1 |
| 12. | Why Latin square design is called a square design? | | CO2 | U | | 1 |
| 13. | What is a factorial design? | | CO2 | R | | 1 |
| 14. | Make a layout for RBD with 5 treatments and 3 replications. | | CO4 | U | | 1 |
| 15. | What could be the reasons for the missing observation in an experiment? | | CO1 | AN | | 1 |
| 16. | What is an experimental error? | | CO1 | R | | 1 |
| 17. | In a 22-factorial experiment, factor A have two levels (*a0, a1*) and  factor B have two levels (*b0, b1*), write down the treatment combinations for the experiment? | | CO3 | U | | 1 |
| 18. | In an experiment with RBD have 4 treatments and control, make a contrast equation to compare the mean of control with other 4 treatment? | | CO3 | U | | 1 |
| 19. | Are split plot experiments being factorial experiments? Why? | | CO1 | U | | 1 |
| 20. | What does that mean that two treatment means are on par? | | CO2 | E | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | List the principles of an experimental design and explain. | | CO1 | | R | 5 |
| 22. | What is a contrast? And when two contrasts are orthogonal? | | CO1 | | U | 5 |
| 23. | Write down the calculation steps of CRD? | | CO2 | | R | 5 |
| 24. | Compare and contrast RBD and LSD. (any 5 points) | | CO3 | | AN | 5 |
| 25. | Interpret the results of the following ANOVA table conducted under CRD.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **SOV** | **df** | **SS** | **MSS** | **Fcal** | **Ftab** | | Treatment | 4 | 4.16 | 1.04 | - | - | | Error | 15 | 1.05 | 0.07 |  |  | | Total | 19 | 5.21 |  |  |  | | | CO3 | | A | 5 |
| 26. | Define Simple effect, main effect and interaction effect of a factorial design. | | CO2 | | A | 5 |
| 27. | Construct the layout of the Latin Square Design with 5 treatments. | | CO4 | | C | 5 |
| 28. | Using the following RBD data, estimate the missing value (*x*) and calculate its upward bias.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Treatments | Replications | | | | | R1 | R2 | R3 | R4 | | 1 | 22.9 | 25.9 | 39.1 | 33.9 | | 2 | 29.5 | 30.4 | *x* | 29.6 | | 3 | 28.8 | 24.4 | 32.1 | 28.6 | | 4 | 47 | 40.9 | 42.8 | 32.1 | | 5 | 28.9 | 20.4 | 21.1 | 31.8 | | | CO3 | | E | 5 |
| 29. | Using the given table, calculate the simple effect, main effect and interaction effect.   |  |  |  | | --- | --- | --- | |  | Factor B | | | Factor A | b0 | b1 | | a0 | 1 | b | | a1 | a | ab | | | CO1 | | E | 5 |
| 30. | Select and write the appropriate formulas for calculating contrast estimate and its sum of square when the treatment totals are given. | | CO3 | | AN | 5 |
| 31. | Comparison between split plot and strip plot design. | | CO2 | | AN | 5 |
| 32. | Construct the layout of the split plot design with 2 main plot treatments, 4 sub plot treatments and 3 replications. | | CO1 | | C | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. |  | An experiment was conducted in RBD to study the comparative performance of fodder sorghum under rain fed conditions. The rearranged data are given in table.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Variety | Replication | | | | | I | II | III | IV | | African Tall | 22.9 | 25.9 | 39.1 | 33.9 | | Co-11 | 29.5 | 30.4 | 35.3 | 29.6 | | FS-1 | 28.8 | 24.4 | 32.1 | 28.6 | | K-7 | 47.0 | 40.9 | 42.8 | 32.1 | | Co-24 | 28.9 | 20.4 | 21.1 | 31.8 | |  | |  |  |
| a. | Are the varietal means significantly different? | CO5 | | E | 10 |
| b. | Find out the better performing variety using LSDt method. | CO5 | | E | 5 |
| 34. |  | An experiment was conducted with RCBD and it was found that treatments are significant at 5 % level of significance. Treatment and its totals are  Control (T1)- 9 kg/ha, FYM 5kg (T2)- 11 kg/ha, FYM 10kg (T3)- 12 kg/ha, Nitrogen 50kg (T4)- 13 kg/ha, Phosphorus 50kg (T5)- 12 kg/ha, Nitrogen 100kg (T6)- 16 kg/ha and Phosphorus 100kg (T7)- 15 kg/ha. The known values are replication (*r*) =4, Error mean sum of square = 0.21, Error *df* =27. |  | |  |  |
|  | a. | Compare whether the organic and inorganic fertilizers influencing the yield similarly or not? | CO5 | | An | 7.5 |
|  | b. | Compare whether the fertilizers influencing the yield similarly to control? | CO5 | | An | 7.5 |
| 35. |  | An experiment conducted with 2 factors *viz*, varieties (V0, V1) and fertilizers (N1, N2) which were replicated 3 times in RCBD design. The layout of the design along with its values were given below,   |  |  |  |  |  | | --- | --- | --- | --- | --- | | R1 | V1N1  (15) | V0N0  (5) | V0N1  (8) | V1N0  (11) | | R2 | V1N1  (15) | V1N0  (10) | V0N0  (6) | V0N1  (8.2) | | R3 | V0N1  (8.5) | V0N0  (5) | V1NO  (11) | V1N1  (16) | |  | |  |  |
|  | a. | Calculate the ANOVA table and interpret. | CO5 | | E | 8 |
|  | b. | Select the appropriate variety and fertilizer which influence the yield significantly. | CO5 | | E | 7 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the concepts of Design of Experiments. |
| CO2 | Remember principles of experimental designs. |
| CO3 | Analyse and select optimum experimental design for their field research. |
| CO4 | Apply the principles of designs while framing the field layouts. |
| CO5 | Remember the applications of experimental designs. |
| CO6 | Analyse the resolvable designs. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 7 | 7 |  | 1 | 5 | 5 | 25 |
| CO2 | 11 | 3 | 5 | 5 | 1 |  | 25 |
| CO3 | 2 | 2 | 5 | 10 | 5 |  | 24 |
| CO4 |  | 1 |  |  |  | 5 | 6 |
| CO5 |  |  |  | 15 | 30 |  | 45 |
| CO6 |  |  |  |  |  |  | 0 |
|  | | | | | | | **125** |



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| **Coruse Code:** | **21AG3217** | **Duration :** | **3hrs** |
| **Course Name :** | **EXPERIMENTAL DESIGNS (2:0:1)** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
|  | **PART-A (20 X 1 =20 MARKS)** | | | |
| 1. | Write the methods to determine the optimum plot size? | CO1 | R | 1 |
| 2. | Expand ANCOVA. | CO5 | R | 1 |
| 3. | Write the general formulae for degrees of freedom. | CO1 | U | 1 |
| 4. | Repetition of treatment by applying to more than one experimental unit is | CO2 | U | 1 |
| 5. | How to reduce error in agricultural experiments? | CO2 | U | 1 |
| 6. | Which experimental design is used in lab or pot experiments? | CO3 | U | 1 |
| 7. | Write the formulae for critical difference. | CO1 | R | 1 |
| 8. | Minimum error degrees of freedom for any experimental design is .............. | CO1 | R | 1 |
| 9. | What is the F table value for (4, 12) at 5% LOS? | CO1 | A | 1 |
| 10. | What is the test statistics for comparing more than two varietal means? | CO4 | U | 1 |
| 11. | Write the adjusted error degrees of freedom in ANCOVA. | CO3 | R | 1 |
| 12. | Name the three basic designs. | CO5 | C | 1 |
| 13. | What do you mean by null hypothesis is rejected for testing 2 treatment means? | CO1 | E | 1 |
| 14. | Write the expression for Fairfield smith variance law. | CO2 | R | 1 |
| 15. | Write any one assumption for ANOVA. | CO1 | R | 1 |
| 16. | If the number of factor is 2 and each factor has 3 levels the factorial experiment is given by 32. (TRUE / FALSE) | CO5 | U | 1 |
| 17. | Suggest any one method for analysis of factorial experiments. | CO3 | R | 1 |
| 18. | If Fcal < Ftab, then what is your interpretation? | CO1 | U | 1 |
| 19. | What is confounding? | CO3 | R | 1 |
| 20. | Grouping of homogeneous experimental units into blocks is known as \_\_\_\_\_\_\_\_\_ | CO1 | U | 1 |

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|  | **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Explain the method to get the soil fertility gradient map. | CO1 | U | 5 |
| 22. | Write a note on data transformation. | CO5 | R | 5 |
| 23. | Explain simple effect, main effect, and interaction effect by taking illustrations. | CO1 | U | 5 |
| 24. | Write the general procedure for testing of hypothesis in the analysis of variance. | CO1 | R | 5 |
| 25. | An experiment was conducted in randomized block design to study the comparative performance of fodder sorghum under irrigated conditions. The varietal means given in the table. (EMS = 29.26, *r* = 4).   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Variety | African Tall | Co-11 | FS-1 | K-7 | Co-24 | | Mean | 30.4 | 31.2 | 28.2 | 40.7 | 25.6 |   Interpret the results. | CO3 | AN | 5 |
| 26. | Explain the randomization in Randomized complete block design with 5 treatments and 4 replications. | CO2 | C | 5 |
| 27. | Write all treatment combinations for 23 and 32 factorial experiments. | CO3 | A | 5 |
| 28. | What do you understand by analysis of Covariance? Illustrate with suitable examples. | CO3 | U | 5 |
| 29. | Write the advantages and disadvantages of split plot design. | CO4 | R | 5 |
| 30. | Write the mathematical model for split plot design and explain. | CO3 | R | 5 |
| 31. | Write the note on contrast method of analysis in 22 factorial experiment. | CO3 | U | 5 |
| 32. | Give the complete statistical analysis of RCBD. | CO3 | R | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. |  | An experiment in CRD with 8 treatments replicated 3 times.   |  |  |  |  | | --- | --- | --- | --- | | Treatment | Replication | | | | R1 | R2 | R3 | | T1 | 12 | 14 | 16 | | T2 | 13 | 18 | 16 | | T3 | 12 | 14 | 17 | | T4 | 10 | 12 | 14 | | T5 | 15 | 13 | 13 | | T6 | 12 | 14 | 15 | | T7 | 11 | 10 | 12 | | T8 | 18 | 16 | 19 | |  |  |  |
| a. | Obtain the ANOVA table. | CO4 | AN | 10 |
|  | b. | Interpret the results. | CO4 | AN | 5 |
| 34. | a. | Explain the randomization procedure and complete statistical analysis of the split-plot design. | CO5 | U | 15 |
| 35. | a. | Analyze the data through the Yates method. | CO5 | E | 10 |
| b. | Select the best variety and spacing combination which influence the height significantly. | CO5 | E | 5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the concepts of Design of Experiments**.** |
| CO2 | Remember the principles of experimental designs |
| CO3 | Analyse and select optimum experimental designs for their field research |
| CO4 | Apply the principles of design while framing the field layouts |
| CO5 | Remember the applications of experimental designs |
| CO6 | Analyze the resolvable designs |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 | 13 | 1 | - | - | - | 25 |
| CO2 | 1 | 2 | - | - | - | 5 | 8 |
| CO3 | 13 | 11 | 5 | 5 | - | - | 34 |
| CO4 | 5 | 1 | - | 15 | - | - | 21 |
| CO5 | 5 | 16 | - | - | 15 | 1 | 37 |
| CO6 | - | - | - | - | - | - | - |
|  | | | | | | | **125** |

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| **Course Code** | **21AG3218** | **Duration :** | **3hrs** |
| **Course Name** | **REMOTE SENSING AND GIS TECHNIQUES FOR SOIL, WATER AND CROP STUDIES** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome / Bloom’s level** | | **Marks** |
| **PART – A (20X1 = 20 MARKS)** | | | | |
| 1. | Define GIS. | CO1/ R | | 1 |
| 2. | Expand the following abbreviations   * IIRS * PAN * GNSS * NASA | CO1/R | | 1 |
| 3. | Who is the remote sensing pioneer in India? | CO1/ R | | 1 |
| 4. | NASA is located at \_\_\_\_\_\_\_\_\_. | CO1/ R | | 1 |
| 5. | Where satellites are positioned in the earth's atmosphere? | CO2/ U | | 1 |
| 6. | Pixels are of \_\_\_\_\_\_\_\_ shape. | CO5/ R | | 1 |
| 7. | \_\_\_\_\_\_\_\_\_\_\_\_ is an Indian regional satellite navigation system. | CO1/ R | | 1 |
| 8. | Name any two global navigation satellite systems with its country. | CO2/ U | | 1 |
| 9. | \_\_\_\_\_\_\_\_\_\_\_\_\_ represents data as a cell or a grid. | CO4/ U | | 1 |
| 10. | Name any two software system used in soil and plant map generation. | CO6/ R | | 1 |
| 11. | Define passive sensors. | CO2/ R | | 1 |
| 12. | List out the types of film used in aerial photographs. | CO 2/ R | | 1 |
| 13. | \_\_\_\_\_\_\_\_\_\_\_\_ is defined as the science of obtaining photograph from the air using aerial platforms, mostly aircraft for studying the surface of the earth. | CO1/ U | | 1 |
| 14. | How will you calculate the scale in aerial photography? | CO2/ R | | 1 |
| 15. | When the camera is focused at infinity, the lens gathers light rays reflected from the objects and transmits them in an orderly fashion to the light-sensitive areas known \_\_\_\_\_\_\_\_\_\_. | CO3/ R | | 1 |
| 16. | Satellites are launched at the \_\_\_\_\_\_\_\_\_ layer of the atmosphere. | CO3/ U | | 1 |
| 17. | ­­­­­­\_\_\_\_\_\_\_\_\_\_\_ is attenuated by its passage through the atmosphere via scattering and absorption. | CO2/ R | | 1 |
| 18. | \_\_\_\_\_\_\_\_\_\_ type of scattering takes place when there are essentially spherical particles present in the atmosphere with diameters approximately equal to the wavelength of radiation. | CO1/ R | | 1 |
| 19. | Unit of an image is \_\_\_\_\_\_\_\_\_. | CO2/ R | | 1 |
| 20. | List out the segments of GNSS system. | CO5/ U | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | Enumerate the Indian earth observation system goals and priorities in a brief manner. | CO1/ U | 5 | |
| 22. | Classify the data products based on the level of processing. | CO2/ An | 5 | |
| 23. | Draw the block diagram of RADAR with its working principle. | CO2/ R | 5 | |
| 24. | Give a brief note on history and development of remote sensing in India. | CO1/ R | 5 | |
| 25. | Differentiate between active sensor and passive sensors. | CO2/ U | 5 | |
| 26. | Give a brief note on visual image interpretation. | CO4/ R | 5 | |
| 27. | Differentiate between spatial and non-spatial data with suitable diagrams. | CO5/ A | 5 | |
| 28. | Elucidate different types of photographic data and its applications. | CO3/ R | 5 | |
| 29. | Write in detail about aerial camera and it types. | CO3/ R | 5 | |
| 30. | Explain the process of base map preparation. | CO5/ U | 5 | |
| 31. | Write down the working principle and applications of GPS in a brief manner. | CO4/ U | 5 | |
| 32. | Write down the applications and significance of remote sensing and GIS in agriculture. | CO6/ A | 5 | |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Give a detailed note on GNSS systems. | CO4/ A | 9 |
| b. | Write a detailed note on propagation of radiation in atmosphere and  their laws. | CO1/ U | 6 |
|  |  |  |  |  |
| 34. | a. | Explain aerial photography, its components with suitable diagrams and list their applications. | CO3/ U | 8 |
| b. | Enumerate the sources and interaction of EMR in a detailed manner. | CO2 / R | 7 |
|  |  |  |  |  |
| 35. | a. | Draw the block diagram of LIDAR, Laser altimeter and radiometer. | CO2/U | 6 |
| b. | Write down the process and application of remote sensing in soil survey, crop yield prediction and groundwater assessment. | CO6 /R | 9 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the basics of remote sensing. | | | | | | | |
| CO2 | Gain knowledge on sensors and image processing. | | | | | | | |
| CO3 | Interpret aerial photographs and imageries. | | | | | | | |
| CO4 | Learn the principles of GIS and its components. | | | | | | | |
| CO5 | Understand the spatial variability in soil and geo-statistical techniques. | | | | | | | |
| CO6 | Learn the applications of remote sensing and GIS techniques. | | | | | | | |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 11 | 12 | - | - | - | - | 23 |
| CO2 | | 17 | 13 | - | 5 | - | - | 35 |
| CO3 | | 11 | 9 | - | - | - | - | 20 |
| CO4 | | 5 | 6 | 9 | - | - | - | 20 |
| CO5 | | 1 | 6 | 5 | - | - | - | 12 |
| CO6 | | 10 | - | 5 | - | - | - | 15 |
|  | | | | | | | | **125** |

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| **Course Code** | **21AG3219** | **Duration** | **3hrs** |
| **Course Name** | **DATA ANALYSIS USING STATISTICAL PACKAGES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Write the EXCEL formula to calculate mean. | | CO1 | R | | 1 |
| 2. | Write the formula of variance of a population. | | CO1 | R | | 1 |
| 3. | What is a pie chart? | | CO1 | R | | 1 |
| 4. | What is the range of regression coefficient? | | CO2 | U | | 1 |
| 5. | Write down the formula for coefficient of variation? | | CO2 | R | | 1 |
| 6. | In the equation *y=ax+b*, what is *b*? | | CO2 | U | | 1 |
| 7. | Which test is used to test the mean of two dependent samples? | | CO2 | R | | 1 |
| 8. | Write the hypothesis for homogeneity of variance for two samples. | | CO1 | R | | 1 |
| 9. | Expand LSDt. | | CO2 | R | | 1 |
| 10. | What is the minimum error *df* of an experiment? | | CO2 | U | | 1 |
| 11. | What, if the mean difference of two treatments are less than CD value? | | CO2 | R | | 1 |
| 12. | If the range of percentage data is between 0-30%, what transformation is preferred? | | CO2 | R | | 1 |
| 13. | Expand STAR. | | CO2 | U | | 1 |
| 14. | To perform correlation analysis, how many numbers of variables required? | | CO2 | AN | | 1 |
| 15. | Total number of plots required for an experiment with 5 treatments and 4 replications is \_\_\_\_\_\_\_\_ | | CO2 | AN | | 1 |
| 16. | In DMRT, what are the possible *p* values for 5 experiments? | | CO3 | A | | 1 |
| 17. | What is the total number of treatments in a 22-factorial experiment? | | CO4 | U | | 1 |
| 18. | Expand PCA. | | CO3 | U | | 1 |
| 19. | Regression coefficient is always negative (True/False). | | CO2 | E | | 1 |
| 20. | Number of factors in a split plot design is \_\_\_\_\_\_\_\_\_ | | CO1 | A | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | List out any 5 descriptive statistics and explain it with EXCEL formula. | | CO1 | | R | 5 |
| 22. | Draw the scatterplot for the following data and interpret.   |  |  |  | | --- | --- | --- | | **States** | **Area (M ha)** | **Production (M tonnes)** | | Uttar Pradesh | 19 | 55 | | Punjab | 15 | 33 | | Rajasthan | 15 | 23 | | Bihar | 6 | 14 | | Karnataka | 7 | 12 | | | CO1 | | U | 5 |
| 23. | Explain two sample *t* test with equal variance with steps. | | CO2 | | R | 5 |
| 24. | Compare the descriptive statistics of two variables   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Variable | Mean | Median | Range | Variance | StdDev | SE\_  Mean | | X | 28.14 | 29 | 16.35 | 21.21 | 4.61 | 1.03 | | Y | 50.22 | 50.49 | 17.37 | 22.92 | 4.79 | 1.07 | | | CO3 | | AN | 5 |
| 25. | List out 5 basic assumptions of ANOVA. | | CO3 | | A | 5 |
| 26. | Provided that the CD values is 2.1. Compare the means of the 5 treatments and interpret. {T1=5, T2=12, T3=13, T4=7 and T5=9} | | CO2 | | A | 5 |
| 27. | Comparison between *z* test and *t* test. | | CO4 | | U | 5 |
| 28. | Regression analysis was carried out between area (M ha) and production (M tonnes) of wheat crop. The analysis results using EXCEL were provided below.  1. Make a final table; 2. Frame the regression equation and 3. interpret   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | ***Coefficients*** | ***SE*** | ***t Stat*** | ***P-value*** | | Intercept | -65.76 | 5.53 | -11.88 | 0.00 | | Area | 2.88 | 0.15 | 18.78 | 0.00 | | | CO3 | | E | 5 |
| 29. | Write the step wise procedure of CRD. | | CO1 | | E | 5 |
| 30. | When to use Split plot design? Write its ANOVA table. | | CO4 | | C | 5 |
| 31. | The STAR results of two varieties of maize, each grown in 15 plots each. Test whether the two varieties variance are homogenous.  Homogeneity of Variances  Variable Method Num DF Den DF F Value Pr(> F)  V1V2 Folded F 14 14 3.89 0.0160 | | CO2 | | A | 5 |
| 32. | Explain DMRT. | | CO3 | | AN | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. |  | Explain the following. |  | |  |  |
|  | a. | Brief the following mean comparison tests.  i. Least significant difference test (LSDt).  ii. Duncan’s Multiple range test (DMRT). | CO5 | | E | 7 |
|  | b. | Following are the STAR results of two varieties of maize, each grown in 15 plots each. Test whether the two varieties are significantly differing with respect to them. | CO5 | | E | 8 |
|  |  | Homogeneity of Variances  Variable Method Num DF Den DF F Value Pr(> F)  V1V2 Folded F 14 14 3.89 0.0160  Two Independent Sample t-Test, h0: mean diff = 0  Variable Method\* Variances DF t Value Pr(>|t|)  V1V2 Satterthwaite Unequal 20.76 -1.18 0.2531\*  At 0.05 level of significance. | | | | |
| 34. | a. | Comparison between correlation and regression (5 points). | C02 | | AN | 5 |
|  | b. | Regression analysis was carried out between area (M ha) and production (M tonnes) of wheat crop. The analysis results using EXCEL were provided below. Using the tables and graph, provide an appropriate answers for the following questions.   1. Write the regression equation using the table 1 and find significance of its coefficients. Make a final table out of it. 2. Read and interpret the table 2. 3. Interpret the regression equation and the graph 1. 4. What will the expected production of wheat when the area of wheat cultivated is about 100 M ha?  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Coefficients** | **SE** | **t Stat** | **P-value** | | Intercept | -65.76 | 5.53 | -11.88 | 0.00 | | Area | 2.88 | 0.15 | 18.78 | 0.00 |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | ***df*** | ***SS*** | ***MS*** | ***F*** | ***P*** | | Regression | 1 | 3129.23 | 3129.23 | 352.79 | 0.00 | | Residual | 32 | 283.84 | 8.87 |  |  | | Total | 33 | 3413.07 |  |  |  | | CO2 | | E | 10 |
| 35. |  | Explain the following. |  | |  |  |
|  | a. | Comparison between *t-*test and ANOVA | CO4 | | E | 5 |
|  | b. | What is data transformation? List out their types and explain. | CO4 | | E | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the procedure for analyzing through statistical packages. |
| CO2 | Interpretation of results obtained from analysis. |
| CO3 | Learn new and advanced softwares for biological data analysis. |
| CO4 | Establish start-ups for data analysis |
| CO5 | Analyse time series data |
| CO6 | Interpretation of the results of AMMI and Multivariate analysis |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 9 | 5 | 1 |  | 5 |  | 20 |
| CO2 | 10 | 4 | 10 | 7 | 11 |  | 42 |
| CO3 |  | 1 | 6 | 10 | 5 |  | 22 |
| CO4 |  | 6 |  |  | 15 | 5 | 26 |
| CO5 |  |  |  |  | 15 |  | 15 |
| CO6 |  |  |  |  |  |  |  |
|  | | | | | | | **125** |



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| **Course Code:** | **21AG3224** | **Duration :** | **3hrs** |
| **Course Name :** | **INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART-A (20 X 1 =20 MARKS)** | | | | |
| 1. | The International Union for the Protection of New Varieties of Plants (UPOV) was established in 1961in \_\_\_\_\_\_\_\_\_. | CO1 | R | 1 |
| 2. | \_\_\_\_\_\_\_\_\_ provides legal protection of a plant variety to a breeder in the form Plant Breeder’s Rights. | CO1 | U | 1 |
| 3. | WIPO offers international regulation of design under \_\_\_\_\_\_\_\_\_ system. | CO1 | R | 1 |
| 4. | ® denotes\_\_\_\_\_\_\_\_\_. | CO2 | R | 1 |
| 5. | The Plant Patent Act was enacted in \_\_\_\_\_\_\_\_\_. | CO2 | U | 1 |
| 6. | A \_\_\_\_\_\_\_\_\_is a local variety of a domesticated plant species which has developed largely adaptation to the natural and cultural environment in which it lives. | CO3 | U | 1 |
| 7. | A \_\_\_\_\_\_\_\_\_is an indication that is used to identify agricultural, natural or manufactured goods having a special quality or reputation or other characteristics. | CO2 | U | 1 |
| 8. | The geographical indication registry is located at \_\_\_\_\_\_\_\_\_**.** | CO2 | R | 1 |
| 9. | \_\_\_\_\_\_\_\_\_ is popularly known as brand name in layman’s language. | CO1 | R | 1 |
| 10. | Cancellation of the rights granted to a person by the grant of a patent is \_\_\_\_\_\_\_\_\_. | CO1 | U | 1 |
| 11. | \_\_\_\_\_\_\_\_\_ is an independent international scientific organization for conservation and use of plant genetic diversity. | CO2 | R | 1 |
| 12. | Convention on Biological Diversity (CBD) came into force in \_\_\_\_\_\_\_\_\_. | CO3 | R | 1 |
| 13. | \_\_\_\_\_\_\_\_\_ is the values of goods are assessed based on the indicators of what people would be willing to pay. | CO5 | R | 1 |
| 14. | In a patent specification \_\_\_\_\_\_\_\_\_ defines the contour of rights. | CO5 | R | 1 |
| 15. | Expand TRIPS. | CO1 | R | 1 |
| 16. | The GI indication for tea is **\_\_\_\_\_\_\_\_\_\_\_.** | CO1 | R | 1 |
| 17. | Trade mark registry headquarter is located at \_\_\_\_\_\_\_\_\_\_\_\_\_**.** | CO2 | R | 1 |
| 18. | Duration of protection of copy right under Berne convention is \_\_\_\_\_\_ | CO2 | R | 1 |
| 19. | Intend to use application filed for services is called \_\_\_\_\_\_\_\_\_. | CO1 | R | 1 |
| 20. | Budapest treaty was signed in Budapest in \_\_\_\_\_\_\_\_\_. | CO1 | R | 1 |

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| **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | Explain about Trade secrecy law. | CO1 | R | 5 |
| 22. | Write about the GI and process of registration. | CO1 | R | 5 |
| 23. | What is traditional cultural expressions? | CO1 | R | 5 |
| 24. | List out the advantages of exclusive rights associated with registered intellectual property used by the owners. | CO2 | A | 5 |
| 25. | Mention the types of Patent. | CO2 | R | 5 |
| 26. | Differentiate trademark and trade secret. | CO2 | R | 5 |
| 27. | Explain the forms of IPRs used in agriculture. | CO3 | U | 5 |
| 28. | Discuss the role of WIPO. | CO3 | R | 5 |
| 29. | Write about the Genetic Use Restriction Technologies (GURTs). | CO4 | R | 5 |
| 30. | Explain the important aspects of Indian Design Act. | CO5 | U | 5 |
| 31. | Describe the types of IP protection. | CO6 | A | 5 |
| 32. | What is IPR? | CO5 | R | 5 |

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| **PART C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | |
| 33. | a. | Briefly discuss the Protection of plant varieties and Farmers right act. | CO4 | R | 7.5 |
| b. | What is mean by *Sui generis* system and explain its significance. | CO2 | R | 7.5 |
| 34. | a. | Elaborate copyright and its act. | CO4 | R | 7.5 |
| b. | Explain International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). | CO2 | R | 7.5 |
| 35. | a. | Explain the Indian Biological Diversity Act, 2002 and its salient features. | CO3 | A | 7.5 |
| b. | Brief about GATT, WTO & TRIPS. | CO3 | A | 7.5 |

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|  | **COURSE OUTCOMES** | | | | | | | | |
| CO1 | Understand GATT, WTO, TRIPs and WIPO for IPR protection. | | | | | | | | |
| CO2 | Know to acquire the patent and copyright for their innovative work. | | | | | | | | |
| CO3 | Copyright for their innovative work. | | | | | | | | |
| CO4 | Explain UPOV, PPV, and FR Act of India. | | | | | | | | |
| CO5 | Apply, Analyze and use ITK strategies. | | | | | | | | |
| CO6 | Achieve new innovative goals. | | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 22 | 2 | - | - | - | - | 24 |
| CO2 | | 30 | 02 | 02 | - | - | - | 37 |
| CO3 | | 06 | 06 | 15 | - | - | - | 27 |
| CO4 | | 20 | - | - | - | - | - | 20 |
| CO5 | | 7 | 5 | - | - | - | - | 12 |
| CO6 | | - | - | 5 | - | - | - | 05 |
| **Total** | | | | | | | | **125** |



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| **Course Code** | **21AG3242** | **Duration** | **3hrs** |
| **Course Name** | **CROP WATER REQUIREMENTS AND IRRIGATION SCHEDULING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Write in detail about different types of Evapotranspiration. | CO1 | An | 10 |
|  | b. | Explain in detail about Consumptive use of water. How can we find out Consumptive use of water by lysimeter experiments. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define crop evapotranspiration. Explain in detail how crop evapotranspiration is determined from pan evaporimeter reading with examples. | CO2 | C | 10 |
|  | b. | Write in detail how evapotranspiration is estimated by empirical methods. | CO4 | C | 10 |
|  |  |  |  |  |  |
| 3. | a. | Define irrigation and types of water use efficiencies. List out the benefits of irrigation. | CO5 | R | 10 |
|  | b. | Explain the approaches for scheduling irrigation and advantages of scheduling irrigation. | CO6 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain how irrigation scheduling is done by IW/CPE ratio and Epan methods with examples. | CO5 | E | 10 |
|  | b. | Explain how irrigation scheduling is done based on soil moisture regime approach with example. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain how irrigation is scheduled by plant indicator methods. | CO6 | A | 10 |
|  | b. | Write in detail about calculation of water requirement of crops based on requirement and source of water. | CO3 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | List out the different methods of irrigation and write a short note on each of them. | CO3 | U | 10 |
|  | b. | What are the critical stages of water requirement of paddy. Explain the water management in nursery and transplanted paddy fields. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain water requirement and irrigation management in sugarcane crop. | CO3 | An | 10 |
|  | b. | Explain the water requirement and irrigation management in groundnut crop. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain pan coefficient and crop coefficient with suitable examples. | CO2 | R | 10 |
|  | b. | Define irrigation scheduling and principles of irrigation scheduling. Also mention net and gross irrigation requirements with suitable examples. | CO3 | R | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Define water requirement of crops. Explain the influence of climatic and management factors on water requirement of crops. | CO3 | An | 10 |
|  | b. | Explain the influence of crop characteristics on water requirement of crops. | CO3 | An | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Identify the different types of climatological nomenclatures for ET. |
| CO2 | Understand crop coefficient and its types. |
| CO3 | Enumerate factors affecting water requirement. |
| CO4 | Understand different methods of determining water requirement by crops. |
| CO5 | Understand the relation between Irrigation Performance and Irrigation Scheduling. |
| CO6 | Outline different indicators for irrigation scheduling. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  | 10 |  | 10 |  |  | 20 |
| CO2 | 20 |  |  |  |  | 10 | 30 |
| CO3 |  | 10 |  | 40 | 10 | 10 | 70 |
| CO4 |  |  |  |  |  | 10 | 10 |
| CO5 | 10 | 10 |  |  | 10 |  | 30 |
| CO6 |  |  | 20 |  |  |  | 20 |
|  | | | | | | | **180** |



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| **Course Code** | **21AG3245** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN SOIL FERTILITY AND CROP MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the fertility capability classification of soil. | CO2 | An | 10 |
|  | b. | Explain nutrient recommendation of crops based on STCR. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Give a brief account of the nitrogen transformation in soil. | CO1 | R | 10 |
|  | b. | Discuss parameters of soil health and explain soil health card. | CO3 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | List out the agronomic practices to improve soil health. | CO3 | E | 10 |
|  | b. | Explain the process of vermicomposting. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Give a brief account of the importance of soil organic carbon and carbon sequestration. | CO1 | An | 10 |
|  | b. | Define biological nitrogen fixation and explain the role of rhizobia in biological N fixation with examples. | CO5 | C | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain biological nitrogen fixation by azotobactor, Azospirillum, Azolla and BGA with examples. Explain seed treatment with Azospirillum. | CO5 | A | 10 |
|  | b. | Explain the role of P, Si and Zn solubilizers and K mobilizer in managing soil fertility. Give an account of azolla multiplication and incorporation in paddy crop. | CO5 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define green and green leaf manuring with examples. Explain their role in soil fertility management. | CO6 | U | 10 |
|  | b. | Explain in detail about INM with suitable examples. | CO6 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the necessity for organic farming and promising organic farming practices. | CO3 | R | 10 |
|  | b. | Explain the precautions to be taken for converting a farm to organic farm. Enlist the advantages of organic farming. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Give a brief account of conservation agriculture. | CO2 | E | 10 |
|  | b. | Define nutrient use efficiency with examples. Explain the factors affecting crop response the fertilizer application. | CO3 | R | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the causes, problems and reclamation of saline soil. | CO2 | An | 10 |
|  | b. | Explain the causes, problems and reclamation of sodic soil. | CO2 | An | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the concepts of soil fertility and productivity. |
| CO2 | Describe various land capability classifications. |
| CO3 | Discuss on the soil health parameters. |
| CO4 | Apply knowledge on various composting technologies. |
| CO5 | Overview on nutrient use efficiency. |
| CO6 | Enumerate integrated nutrient management technologies. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 |  | 10 | 10 |  |  | 30 |
| CO2 |  |  |  | 30 | 10 |  | 40 |
| CO3 | 30 |  | 10 |  | 10 |  | 50 |
| CO4 |  |  | 10 |  |  |  | 10 |
| CO5 |  |  | 10 |  |  | 20 | 30 |
| CO6 |  | 20 |  |  |  | 20 | 20 |
|  | | | | | | | **180** |



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| **Course Code** | **21AG3246** | **Duration** | **3hrs** |
| **Course Name** | **GENOMICS ASSISTED BREEDING IN CROPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the fine structure and functions of Mitochondria. | CO5 | A | 10 |
|  | b. | Discuss the role of mitochondrial genes in crop improvement. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the structure and functions of plastids. | CO4 | U | 10 |
|  | b. | What is the role of plastid genes in the inheritance of characters? | CO6 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the concept of Genomic in situ hybridization (GISH). | CO3 | U | 10 |
|  | b. | Application of GISH in molecular studies. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the concept of Fluorescence in situ hybridization (FISH). | CO2 | R | 10 |
|  | b. | Application of FISH in molecular studies. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe the procedure of constructing genetic map using molecular markers. | CO3 | R | 10 |
|  | b. | What is QTL? How it is applied in crop breeding. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | What are the molecular markers used in genotyping. | CO5 | A | 10 |
|  | b. | Discuss the principles and techniques in genome sequencing | CO3 | C | 10 |
|  |  |  |  |  |  |
| 7. | a. | Application of TIILING and Eco – TILLING for crop improvement. | CO6 | A | 10 |
|  | b. | Describe the role of transcriptomics and proteomics in biology. | CO2 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Evaluate the role of bioinformatics in structural and functional genomics. | CO4 | An | 10 |
|  | b. | Explain the role of transposon in the inheritance of characters | CO5 | R | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the regulation and expression of genes in plants. | CO5 | U | 10 |
|  | b. | Briefly discuss the advanced genomic approaches in crop breeding. | CO5 | E | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the molecular description of nuclear and organellar genomes. |
| CO2 | Analyze the mechanism of genetic control over gene expression and regulation in plants. |
| CO3 | Develop trait associated markers and primers for molecular breeding. |
| CO4 | Incorporate the knowledge in sequencing techniques across generations. |
| CO5 | Analyze the strategies for TILLING and ECO-TILLING. |
| CO6 | Understand the bioinformatics tools, databases in advanced genomics. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  |  | 10 |  |  | 10 |
| CO2 | 10 | 10 |  |  |  | 10 | 30 |
| CO3 | 10 | 10 |  |  |  | 10 | 30 |
| CO4 |  | 10 | 10 | 10,10 |  |  | 40 |
| CO5 | 10 | 10 |  | 10,10 | 10 |  | 50 |
| CO6 |  |  | 10 | 10 |  |  | 20 |
|  | 30 | 40 | 20 | 60 | 10 | 20 | **180** |
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| **Course Code** | **21AG3248** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCED PLANT BREEDING SYSTEMS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain mating systems and their importance in crop improvement. | CO1 | U | 10 |
|  | b. | Write in detail about mechanisms promoting self and cross-pollination. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define Self-incompatibility. Explain the mechanism of Self Incompatibility. | CO2 | R | 10 |
|  | b. | What are the types of male sterility and explain the CGMS system in crop plants? | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | What is Apomixis? Explain its types and importance in crop improvement. | CO3 | A | 20 |
|  | b. | What is heterosis? Explain its types and the genetic basis of heterosis. | CO3 | A |  |
|  |  | **(OR)** |  |  |  |
| 4. | a. | What is pure-line? Explain pure-line selection with a neat diagram. | CO4 | U | 20 |
|  | b. | Differentiate composites and synthetics. Give examples of composite and synthetic varieties. | CO4 | U |  |
|  |  |  |  |  |  |
| 5. | a. | Define Average effect and Breeding value. Explain the components of variance in detail. | CO2 | An | 20 |
|  | b. | Differentiate qualitative and quantitative characters with suitable examples. | CO2 | An |  |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the methods to overcome self-Incompatibility. | CO4 | A | 20 |
|  | b. | Explain the concepts of Pure-line selection and Progeny testing with a suitable example. | CO4 | A |  |
|  |  |  |  |  |  |
| 7. | a. | Explain in detail about genetically engineered male sterility in crop plants. | CO5 | A | 20 |
|  | b. | What is the clonal selection and explain in detail the procedure with a neat diagram? | CO5 | A |  |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the recent advances in breeding for biotic and abiotic stress in crop plants. | CO4 | E | 20 |
|  | b. | What is mutation breeding? Give examples of successful milestones in mutation breeding. | CO4 | E |  |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Breeding methods followed in cross-pollinated crops? Explain the pedigree method of breeding. | CO4 | U | 20 |
|  | b. | Explain the reciprocal recurrent selection with a neat diagram. | CO4 | U |  |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the evolutionary concepts of plant breeding. |
| CO2 | Apply the principles of plant breeding in developing breeding populations. |
| CO3 | Synthesize Mendelian and complex populations. |
| CO4 | Understand the selection principles for self- and cross-pollinated crops. |
| CO5 | Analyze different genetic engineering methods for developing male sterile populations. |
| CO6 | Generate new cyto-nuclear systems to diversify the male sterile systems. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  | 20 |  |  |  |  | 20 |
| CO2 | 20 |  |  | 20 |  |  | 40 |
| CO3 |  |  | 20 |  |  |  | 20 |
| CO4 |  | 40 | 20 |  | 20 |  | 80 |
| CO5 |  |  | 20 |  |  |  | 20 |
| CO6 |  |  |  |  |  |  | - |
|  | | | | | | | **180** |



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| **Course Code** | **21AG3251** | **Duration** | **3hrs** |
| **Course Name** | **BREEDING FOR STRESS AND QUALITY TRAITS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Enumerate the mechanisms of insect resistance in plants. | CO3 | U | 10 |
|  | b. | Suggest a breeding strategy for imparting insect resistance in crop plants. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | How the abiotic stress factors affect the metabolic pathways and limit crop productivity. | CO2 | A | 10 |
|  | b. | What is the role of molecular markers in abiotic stress breeding | CO3 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the genetic mechanisms of disease resistance in plants. | CO2 | E | 10 |
|  | b. | Outline the procedure for imparting horizontal resistance in plants. | CO2 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the conventional breeding approaches to develop resistant varieties. | CO1 | R | 10 |
|  | b. | Explain the role of wild relatives in resistance breeding. | CO1 | E | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the role of proteomics, metabolomics and transcriptomics in stress management. | CO3 | U | 10 |
|  | b. | Differentiate between gene silencing and gene editing how it affects gene expression. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the concept of biopharming. | CO5 | C | 10 |
|  | b. | Discuss the achievements and challenges in biopharming. | CO5 | E | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the role of transgenics in targeted quality improvement in crop plants. | CO2 | A | 10 |
|  | b. | Discuss the achievements in biofortification with the help of case studies. | CO6 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | What is the concept of edible vaccines? Discuss the problems and prospects of edible vaccine. | CO3 | An | 10 |
|  | b. | What are ethical and biosafety management issues in transgenic crop production. | CO6 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Compare the different types of molecular markers used in crop improvement. | CO5 | E | 10 |
|  | b. | Role of molecular markers in selecting plants from the segregating generations. | CO5 | U | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Identify and screen the tolerant and susceptible lines. |
| CO2 | Understand the kind of stresses and its impact on plant growth. |
| CO3 | Realize the importance of nutrition in food and its enhancement by breeding. |
| CO4 | Evaluate the novel breeding techniques for stress tolerance in plants. |
| CO5 | Recognize the role of molecular tools in stress and quality breeding. |
| CO6 | Analyze the antinutritional factors in crops. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 |  |  |  | 10 |  | 20 |
| CO2 |  |  | 20 |  | 10 | 10 | 40 |
| CO3 |  | 20 |  | 20 |  |  | 40 |
| CO4 |  | 10 |  |  |  |  | 10 |
| CO5 |  | 10 | 10 |  | 20 | 10 | 50 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | 10 | 50 | 40 | 20 | 40 | 20 | **180** |
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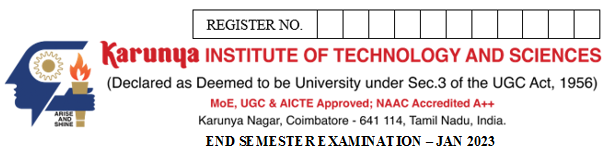
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| **Course Code** | **21HO1251** | **Duration** | **3hrs** |
| **Course Name** | **FUNDAMENTALS OF HORTICULTURE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | India stands\_\_\_\_\_\_\_\_\_\_ in production of fruits and vegetables. | | CO1 | R | | 1 |
| 2. | Mention the vitamin present in guava. | | CO1 | R | | 1 |
| 3. | Write the meaning of ‘Hortus’ and ‘Cultura’. | | CO1 | R | | 1 |
| 4. | Define precocity. | | CO1 | R | | 1 |
| 5. | Write any two common diseases of plants at nursery stage. | | CO3 | R | | 1 |
| 6. | Mention two examples for inverted ‘T’ budding. | | CO3 | An | | 1 |
| 7. | Define graft incompatibility. | | CO3 | R | | 1 |
| 8. | Give two examples for herbaceous perennial plants. | | CO3 | R | | 1 |
| 9. | Write two examples for cut flowers. | | CO1 | R | | 1 |
| 10. | Define intercropping. | | CO4 | R | | 1 |
| 11. | Expand ICAR and IIHR | | CO1 | R | | 1 |
| 12. | Name two vegetables used in pickle preparation. | | CO4 | R | | 1 |
| 13. | Define air layering. | | CO3 | An | | 1 |
| 14. | Write the mode of propagation of sexually propagated crop. | | CO3 | R | | 1 |
| 15. | Name two external factors affecting growth and development of plant. | | CO1 | R | | 1 |
| 16. | What is photoperiodism? | | CO4 | R | | 1 |
| 17. | Define hydroponics. | | CO5 | An | | 1 |
| 18. | Name the crop exhibits polyembryony. | | CO5 | R | | 1 |
| 19. | Name any two leafy vegetables. | | CO1 | R | | 1 |
| 20. | Define High density planting. | | CO4 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Discuss the internal factors which influence growth and development of plants. | | CO5 | | An | 5 |
| 22. | Write the significance of polyembryony. | | CO3 | | U | 5 |
| 23. | Mention the advantages and disadvantages of rejuvenation of old orchards. | | CO5 | | R | 5 |
| 24. | Explain ‘T’ budding and patch budding. | | CO3 | | An | 5 |
| 25. | Write the advantages of sexual and asexual mode of propagation in plants. | | CO3 | | R | 5 |
| 26. | Explain contour planting system. | | CO4 | | R | 5 |
| 27. | Define clean culture, mulching, sod and sod mulch. | | CO4 | | U | 5 |
| 28. | Discuss the methods of fertilizer application. | | CO5 | | R | 5 |
| 29. | Difference between intercropping and mixed cropping. | | CO4 | | U | 5 |
| 30. | Mention the different branches of horticulture. | | CO1 | | R | 5 |
| 31. | Discuss rectangular system of planting method. | | CO4 | | R | 5 |
| 32. | Explain fertigation and its advantages. | | CO4 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Explain hardwood, semi hardwood, softwood and herbaceous cuttings. | CO3 | | R | 7.5 |
|  | b. | Discuss simple layering and air layering. | CO3 | | An | 7.5 |
| 34. | a. | Enumerate the causes of graft incompatibility. | CO3 | | R | 7.5 |
|  | b. | Name the crops which are grown in temperate, subtropical and tropical climate condition. | CO2 | | R | 7.5 |
| 35. | a. | Write a detailed note on training and its types in fruit crops. | CO4 | | U | 7.5 |
|  | b. | Discuss the scope and importance of horticultural crops. | CO1 | | R | 7.5 |

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Definitions, importance-scope of horticultural crops, branches, methods and techniques. | | | | | | | |
| CO2 | Agro climatic zones of India. | | | | | | | |
| CO3 | Different methods of plant propagation . | | | | | | | |
| CO4 | Different types of planting systems and irrigation, training and pruning. | | | | | | | |
| CO5 | Apply principles of orchard management and nursery. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** | |
| CO1 | | 20.5 | - | - | 14.5 | - | - | 35 | |
| CO2 | | 7.5 | - | - | - | - | - | 7.5 | |
| CO3 | | 24 | 5 | - | - | - | - | 29 | |
| CO4 | | 19 | 17.5 | - | - | - | - | 36.5 | |
| CO5 | | 11 | - | - | 6 | - | - | 17 | |
| CO6 | |  |  |  |  |  |  |  | |
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| **Coruse Code:** | **21HO1251** | **Duration :** | **3hrs** |
| **Course Name :** | **FUNDAMENTALS OF HORTICULTURE** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART-A (20 X 1 =20 MARKS)** | | | | |
| 1. | What is the current area and production of horticultural crops in India? | CO1 | C | 1 |
| 2. | Give examples for the crops grown for beverage properties. | CO1 | R | 1 |
| 3. | Differentiate multiple and aggregate fruit with examples. | CO1 | An | 1 |
| 4. | Mention two fruits rich in Vitamn C. | CO1 | R | 1 |
| 5. | What are the nutrients present in bone meal? | CO4 | R | 1 |
| 6. | Name two green manure crops. | CO4 | A | 1 |
| 7. | What are the wind breaks used in orchard? | CO5 | A | 1 |
| 8. | What is a biofertilizer? Name any two biofertilizers used for seed treatment. | CO4 | E | 1 |
| 9. | Mention the use of protray in horticulture. | CO4 | An | 1 |
| 10. | How herbaceous stem cuttings are prepared? Give examples. | CO6 | C | 1 |
| 11. | Define parthenocarpy. Give example. | CO2 | C | 1 |
| 12. | Differentiate multiple cropping and multitier cropping. | CO6 | An | 1 |
| 13. | Differentiate self fertile and self sterile. | CO2 | An | 1 |
| 14. | Give five examples for organic manures. | CO6 | R | 1 |
| 15. | What is ripening hormone? Mention any two physiological role of the hormone in crops. | CO2 | An | 1 |
| 16. | Give two examples for post emergent weedicide. | CO4 | R | 1 |
| 17. | Write two uses of fertigation. | CO4 | A | 1 |
| 18. | Differentiate training and pruning. | CO6 | An | 1 |
| 19. | List out the crops grown in a kitchen garden. | CO1 | R | 1 |
| 20. | What is the use of top working? | CO6 | E | 1 |

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| **PART B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | |
| 21. | Write about the classification of horticultural crops with examples. | CO1 | R | 5 |
| 22. | Write a note on scenario on area, production, export and import of horticultural crops in India. | CO3 | C | 5 |
| 23. | Discuss the environmental factors affecting growth and development of horticultural crops. | CO2 | An | 5 |
| 24. | Explain different types of bearing habits with examples. | CO2 | U | 5 |
| 25. | Define sexual propagation. What are the merits and demerits of sexual propagation? | CO6 | E | 5 |
| 26. | Write a note on influence of root stock on scion with examples. | CO2 | An | 5 |
| 27. | List out different types of Apomixis and polyembryony. What are the significances of apomixis and polyembryony in horticultural crop production? | CO6 | U | 5 |
| 28. | Explain different types of planting systems with diagrams. | CO5 | A | 5 |
| 29. | Discuss on various methods of irrigation systems adopted for horticultural crops. | CO4 | A | 5 |
| 30. | Discuss on different systems of cropping in horticultural crops. | CO6 | U | 5 |
| 31. | Write about the production techniques for banana. | CO4 | C | 5 |
| 32. | Supply chain management and its implications in horticulture – Analyse. | CO3 | An | 5 |

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|  |  | **PART C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | |
| 33. | a. | Discuss in detail on the scope and importance of horticultural crops in India. | CO1 | E | 7.5 |
| b. | What are the different vegetative methods of propagation? Discuss in detail with diagrams? | CO6 | R | 7.5 |
| 34. | a. | What are the different features of an orchard? Explain about the concepts, lay out and establishment of an orchard. | CO5 | U | 7.5 |
| b. | Furnish the internal and external factors causing unfruitfulness in horticultural crops. What are the measures to overcome unfruitfulness? | CO2 | An | 7.5 |
| 35. | a. | Define plant growth regulators. How plant growth regulators are useful in horticultural crop production? | CO6 | A | 7.5 |
| b. | Explain the salient features of organic farming and its importance in the horticultural crop production. | CO6 | An | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Explain the significance and scope of horticultural crops. |
| CO2 | Identify and describe the growth and development of various horticultural crops. |
| CO3 | Discuss the production of horticultural crops in the country and related imports and exports. |
| CO4 | Demonstrate the production techniques of horticultural crops. |
| CO5 | Plan the establishment of Orchard and its management. |
| CO6 | Practice Special horticultural operations and organic farming in these crops. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 8 | - | - | 1 | 7.5 | 1 | 17.5 |
| CO2 | - | 5 | - | 19.5 | - | 1 | 25.5 |
| CO3 | - | - | - | 5 | - | 5 | 10 |
| CO4 | 2 | - | 7 | 1 | 1 | 5 | 16 |
| CO5 | - | 7.5 | 6 | - | - | - | 13.5 |
| CO6 | 8.5 | 10 | 7.5 | 9.5 | 6 | 1 | 42.5 |
|  | | | | | | | **125** |



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| **Course Code** | **21HO1270** | **Duration** | **3hrs** |
| **Course Name** | **PRODUCTION TECHNOLOY FOR FRUIT AND PLANTATION CROPS** | **Max. Marks** | **100** |

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| **Q.**  **No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | |
| 1. | Write the family of citrus and papaya. | | CO3 | R | | 1 |
| 2. | Name any two plantation crops grown in Tamil Nadu. | | CO1 | R | | 1 |
| 3. | Name the important institutes working on fruits and plantation crops. | | CO1 | R | | 1 |
| 4. | What is budding? | | CO2 | R | | 1 |
| 5. | Pollination in coconut. | | CO3 | R | | 1 |
| 6. | Write the scientific name of sapota. | | CO3 | C | | 1 |
| 7. | Denavelling is practiced in which fruit crop? | | CO3 | R | | 1 |
| 8. | Write two important rootstocks of mango. | | CO2 | R | | 1 |
| 9. | List any two fruit crops in which bahar treatment is followed. | | CO3 | R | | 1 |
| 10. | Define mango malformation? Mention its types. | | CO6 | R | | 1 |
| 11. | Central plantation crops research institute is located in which state? | | CO1 | U | | 1 |
| 12. | Write the scientific name of banana and coconut. | | CO3 | R | | 1 |
| 13. | Write any two fruits rich in Vitamin A. | | CO1 | R | | 1 |
| 14. | Mention the crop in which paring and pralinage technique observed. | | CO3 | R | | 1 |
| 15. | Write any two important mango varieties. | | CO3 | R | | 1 |
| 16. | Family of pomegranate. | | CO3 | R | | 1 |
| 17. | Name any two important physiological disorders in mango. | | CO6 | R | | 1 |
| 18. | Papaya is propagated through\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | CO2 | R | | 1 |
| 19. | Write the commercial propagation method in guava. | | CO2 | C | | 1 |
| 20. | Define pomology. | | CO1 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Differentiate tall and dwarf palms in coconut with examples. | | CO3 | U | | 5 |
| 22. | Differentiate climacteric and non-climacteric fruits with examples. | | CO3 | U | | 5 |
| 23. | Enumerate the propagation methods in mango. | | CO2 | R | | 5 |
| 24. | Write in detail about bahar treatment in guava. | | CO3 | | C | 5 |
| 25. | Write the importance of rootstock and scion in fruit crops. | | CO2 | | C | 5 |
| 26. | Write the important processed products prepared out of arecanut. | | CO3 | | C | 5 |
| 27. | Name the important grades of tea, coffee and rubber. | | CO3 | | R | 5 |
| 28. | Write in detail the genomic constitution of banana. | | CO3 | | C | 5 |
| 29. | List the important varieties of papaya. | | CO3 | | R | 5 |
| 30. | Write the spacing followed for mango, banana, citrus, papaya, guava. | | CO3 | | C | 5 |
| 31. | Write scientific name of any five fruit crops with one health benefit. | | CO3 | | C | 5 |
| 32. | List the important varieties of mango. | | CO3 | | R | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Write in detail the rubber tapping process. | CO3 | | C | 7.5 |
|  | b. | Describe important physiological disorders in banana. | CO6 | | R | 7.5 |
| 34. | a. | Write the scope and importance of fruits and plantation crops. | CO1 | | C | 7.5 |
|  | b. | Write the flow chart for processing of tea. | CO3 | | C | 7.5 |
| 35. | a. | Write in detail the paring and prolinage technique of banana. | CO3 | | C | 7.5 |
|  | b. | Describe the physiological disorders observed in mango, guava and citrus. | CO6 | | R | 7.5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the scope and importance of fruit and plantation crop production. |
| CO2 | Apply propagation methods in fruit and plantation crops. |
| CO3 | Apply production technologies in fruit and plantation crops. |
| CO4 | Manage pests of fruit and plantation crops. |
| CO5 | Control diseases of fruits and plantation crops. |
| CO6 | Handle physiological disorders of fruit and plantation crops. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | **4** | 1 | - | - | - | 7.5 | 12.5 |
| CO2 | **8** | - | - | - | - | 6 | 14 |
| CO3 | **23** | 10 | - | - | - | 48.5 | 81.5 |
| CO4 | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - |
| CO6 | **17** | **-** | **-** | **-** | **-** | **-** | **17** |
|  | | | | | | | **125** |



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| **Course Code** | **21HO2271** | **Duration** | **3hrs** |
| **Course Name** | **PRODUCTION TECHNOLOGY FOR VEGETABLES AND SPICES** | **Max.Marks** | **100** |

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| **Q.**  **No.** | **Questions** | | **Course**  **Outcome** | **Bloom’s**  **Level** | | **Marks** |
| **PART– A(20 X1 =20 MARKS)** | | | | | | |
| 1. | Name the economic part of cauliflower. | | CO 1 | R | | 1 |
| 2. | Name the vegetable crop in which metaxenia is found. | | CO 2 | R | | 1 |
| 3. | Recall the scientific name of bitter gourd. | | CO 1 | R | | 1 |
| 4. | Give two examples for perennial vegetables. | | CO 2 | U | | 1 |
| 5. | Mention the propagating material in potato. | | CO 1 | A | | 1 |
| 6. | Nutmeg belongs to the family. | | CO 2 | R | | 1 |
| 7. | Principle compound present in black pepper. | | CO 4 | U | | 1 |
| 8. | Covering the curds with leaves in cauliflower is called as \_\_\_\_\_\_. | | CO 3 | A | | 1 |
| 9. | Bolting is seen in \_\_\_\_\_\_\_\_\_\_\_\_. | | CO 3 | An | | 1 |
| 10. | Commercial vegetative propagation material used in drumstick. | | CO 2 | A | | 1 |
| 11. | Mention the hermaphrodite variety of bitter gourd. | | CO 2 | R | | 1 |
| 12. | Give two examples for root crops. | | CO 1 | R | | 1 |
| 13. | Name the antinutritional factor present in leafy vegetables. | | CO 5 | A | | 1 |
| 14. | Mention the economic part of ginger. | | CO 4 | R | | 1 |
| 15. | General pH required for cultivation of vegetable crops. | | CO 2 | An | | 1 |
| 16. | Mention the top export oriented vegetable crops from India. | | CO 1 | A | | 1 |
| 17. | Mention two important varieties of cinnamon. | | CO 4 | R | | 1 |
| 18. | Pungency in onion is due to\_\_\_\_\_\_\_\_\_\_\_. | | CO 5 | R | | 1 |
| 19. | Mention any two institutes working on onion and garlic. | | CO 2 | R | | 1 |
| 20. | Zonning is a physiological disorder seen in\_\_\_\_\_\_\_\_\_\_. | | CO 3 | An | | 1 |
| **PART– B(10 X5 =50MARKS)**  **(Answer any 10 from the following)** | | | | | | |
| 21. | Describe true potato seed technology. Give its advantages and disadvantages. | | CO 2 | A | | 5 |
| 22. | Write in detail about the processing of ginger. | | CO 6 | A | | 5 |
| 23. | Enumerate the different sex forms seen in cucurbits. | | CO 2 | U | | 5 |
| 24. | Differentiate Mysore and Malabar cardamom. | | CO 4 | | An | 5 |
| 25. | Write the scientific name of any five spices with their economic part. | | CO 1 | | R | 5 |
| 26. | Mention important varieties in pepper (any ten). | | CO2 | | R | 5 |
| 27. | Write the major pest and diseases observed in solanaceous crops and their management. | | CO 3 | | A | 5 |
| 28. | Write the general features of cucurbits. | | CO 2 | | A | 5 |
| 29. | Write the maturity indices of tomato, carrot, cauliflower and cucumber. | | CO 5 | | A | 5 |
| 30. | Write in detail about the processing of turmeric. | | CO 6 | | A | 5 |
| 31. | Write the production technology of onion. | | CO 2 | | An | 5 |
| 32. | Describe the physiological disorders of root crops. | | CO 3 | | An | 5 |
| **PART– C(2 X15 =30MARKS)**  **(Answer any 2 from the following)** | | | | | | |
| 33. | a. | Describe the different propagation methods in black pepper. | CO 4 | | A | 8 |
|  | b. | Describe in detail about the value added products from pepper. | CO 6 | | An | 7 |
| 34. | a. | Write in detail about the physiological disorders observed in crucifers. | CO 3 | | An | 7.5 |
|  | b. | Describe the establishment of kitchen garden and its advantages with proper layout plan for five members family. | CO 4 | | E | 7.5 |
| 35. | a. | Write in detail about the scope and importance of vegetables and spices cultivation in India. | CO 1 | | U | 10 |
|  | b. | What is fertigation? Write the advantages of drip irrigation in vegetable crops. | CO 2 | | A | 5 |

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|  | **COURSEOUTCOMES** | | | | | | | | |
| CO1 | Appreciate the role of vegetables and spices in human nutrition and national economy. | | | | | | | | |
| CO2 | Follow scientific agronomic practices in producing tropical vegetable and spice crops. | | | | | | | | |
| CO3 | Control pest, diseases, weed and physiological disorders in tropical vegetable and spices crops | | | | | | | | |
| CO4 | Create and maintain kitchen garden and spices | | | | | | | | |
| CO5 | Understand the harvesting methods of vegetable and spice crops | | | | | | | | |
| CO6 | Apply post-harvest technology in vegetable and spice crops | | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO/P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 8 | 10 | 2 | - | - | - | 20 |
| CO2 | | 9 | 6 | 16 | 6 | - | - | 37 |
| CO3 | | - | - | 6 | 14.50 | - | - | 20.50 |
| CO4 | | 2 | 1 | 8 | 5 | 7.50 | - | 23.50 |
| CO5 | | 1 | - | 6 | - | - | - | 7 |
| CO6 | | - | - | 10 | 7 | - | - | 17 |
|  | | | | | | | | **125** |



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| **Course Code** | **21HO3271** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCES IN GROWTH PHYSIOLOGY OF FRUIT CROPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Critically define growth, and briefly explain the double sigmoid curve observed in growth. | CO3 | U | 10 |
|  | b. | List out the various parameters to analyze the growth of fruit crops. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss about the physiology of fruit ripening. | CO2 | A | 10 |
|  | b. | Explain the techniques to regulate flowering and fruit set. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss about parthenocarpy and its induction in fruit crops. | CO3 | A | 10 |
|  | b. | List out the physiological effects of Auxin. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss about the regulation of ethylene biosynthetic pathway and ripening. | CO2 | U | 10 |
|  | b. | Ethylene production in climacteric and non-climacteric fruits, and interpretation of the ethylene curve in maturity and ripening. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | GA biosynthetic pathways and classification of GAs. | CO2 | U | 10 |
|  | b. | Growth retardants, their classification and mode of action in fruit crops. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss about the molecular approaches in growth regulation of fruit crops. | CO6 | U | 10 |
|  | b. | Discuss fruitfulness and unfruitfulness in fruit crops. | CO3 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | List out the growth factors which regulate the growth in fruit crops. | CO1 | R | 10 |
|  | b. | Briefly explain about the internal factors which regulate the growth in fruit crops. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Differentiate senescence and aging, and give the latest concepts of senescence. | CO3 | U | 10 |
|  | b. | Write about the effect of PGRs on flowering and fruit set in fruit crops. | CO2 | A | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Write about the types of sinks in plants. | CO2 | U | 10 |
|  | b. | Critically explain about the source and sink relationships. | CO3 | U | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Describe the eco-physiological influences on growth and development of fruit crops. |
| CO2 | Explain on the biosynthesis of growth regulators and retardants. |
| CO3 | Enumerate on the physiology of plant at various stages of growth. |
| CO4 | Discuss on the root and canopy regulation of fruits. |
| CO5 | Elucidate on the canopy management for orchards. |
| CO6 | Overview on the molecular and genetic approaches in crop growth regulation. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 20 | - | - | - | - | - | 20 |
| CO2 | 20 | 40 | 30 | - |  |  | 90 |
| CO3 | 10 | 30 | 10 | 10 | - | - | 60 |
| CO4 | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - |
| CO6 | - | 10 | - | - | - | - | 10 |
| **Total** | | | | | | | **180** |



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| **Course Code** | **21HO3274** | **Duration** | **3hrs** |
| **Course Name** | **STRESS MANAGEMENT IN HORTICULTURE CROPS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Briefly explain adaptation, climate resilience of crops with special reference to horticulture crops under extreme climate. | CO4 | U | 10 |
|  | b. | Define abscission, Abscission zone and classification of process of abscission. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Critically discuss about the canopy management in orchard. | CO4 | A | 10 |
|  | b. | Bearing habit with reference to position, branch angle and order of branching. | CO6 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the advances in morphological traits as indices being used in fixing irrigation schedule. | CO6 | U | 10 |
|  | b. | Describe the bearing habit of early, mid and late maturity crops with respect to growing degree day and heat units. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | With cutting examples classify the various types of stress in crops. | CO1 | U | 10 |
|  | b. | Heat shock genes, and its genetic manipulation to overcome the heat. | CO6 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Temperature stress management in horticultural crops. | CO4 | An | 10 |
|  | b. | Improvement in water management practices with respect to stress. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Write about the manipulation of sources with relationship for higher productivity under stress | CO6 | U | 10 |
|  | b. | Discuss about the use of anti-transpirants and PGRs in stress management of fruit crops. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Importance of CAM and C4plants from the point of water and temperature stress, state specific examples from fruit crops. | CO4 | U | 10 |
|  | b. | Pre-inductive stress is a requirement in many horticulture crops for flowering- Explain briefly. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Briefly explain different types of stress. | CO1 | U | 10 |
|  | b. | Discuss about the Ethylene and ABA role in stress. | CO2 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the necessity of conservation of germplasm and gene banks. | CO6 | An | 10 |
|  | b. | Explain the concept that extinction is a part of biological evolution. | CO6 | U | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the classification of stress. |
| CO2 | Discuss the metabolic changes induced by stress factors. |
| CO3 | Enumerate the crop modeling for stress situations. |
| CO4 | Describe the methods of stress management in fruit crops. |
| CO5 | Discuss on the water use efficiency. |
| CO6 | Elucidate the crop growth sustainability indices. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | - | 30 | - | - | - | - | 30 |
| CO2 | - | 10 | - | - | - | - | 10 |
| CO3 | - | - | - | - | - | - | - |
| CO4 | 10 | 20 | 30 | 10 | - | - | 70 |
| CO5 | - | - | 10 | - | - | - | 10 |
| CO6 | 10 | 30 | 10 | 10 |  |  | 60 |
| **Total** | | | | | | | **180** |



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| **Course Code** | **22AG3400** | **Duration** | **3hrs** |
| **Course Name** | **MEMBRANE TECHNOLOGY FOR WATER AND WASTEWATER TREATMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **Course Outcome** | **Bloom’s Level** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss in detail different types of membrane filtration in water purification. | CO5 | U | 16 |
|  | b. | List down electrically driven processes for separation of ions from wastewater. | CO1 | R | 4 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Outline the working principle involved in membrane filtration. | CO5 | U | 4 |
|  | b. | Analyse different type of materials used for making membranes and their properties. | CO1 | An | 16 |
|  |  |  |  |  |  |
| 3. | a. | Distinguish between dead-end and crossflow filtration. | CO3 | An | 6 |
|  | b. | Compare spiral wound and tubular membrane module in water filtration. | CO6 | U | 14 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Examine the fabrication method of hollow fibre membranes. | CO1 | An | 10 |
|  | b. | Analyse the transport of ions through membranes through solution – diffusion model. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Categorize different types of polymeric, ceramic and hybrid materials used for membrane fabrication. | CO1 | U | 4 |
|  | b. | Explain any two methods of preparation of Polysulphone and PVC membranes. | CO1 | An | 16 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain in detail the working principle of electrospinning method of fabrication of membranes. What are the controlling factors. | CO2 | An | 10 |
|  | b. | How are nanocomposite membranes fabricated in the lab? | CO2 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Examine the properties of porous, non porous and ion exchange membranes and explain how the analysis is done. | CO3 | An | 10 |
|  | b. | Outline the significance of zeta potential in membrane filtration process. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Outline the mechanism of membrane fouling mechanisms. | CO5 | U | 6 |
|  | b. | Discuss in detail the different types of foulants and list down the materials can be used for fabrication of antifouling membranes. | CO5 | An | 14 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | How the surface morphology and elemental composition of the reject are determined. | CO4 | Ap | 10 |
|  | b. | Summarize one case study of application of polymeric membrane in treatment of industrial effluent. | CO4 | Ap | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Identify and fabricate suitable type of membranes (polymeric and ceramic) based on the type of treatment (drinking water, groundwater or wastewater). |
| CO2 | Optimize the operational and design parameters of polymeric membranes for specific ion removal. |
| CO3 | Test the fabricated membranes for strength, porosity and stability. |
| CO4 | Analyse the characteristics of membranes. |
| CO5 | Evaluate the performance of polymeric/ceramic membranes in removal of ions. |
| CO6 | Select the suitable type of membrane material to avoid membrane fouling. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 8 |  |  | 62 |  |  | 70 |
| CO2 |  | 10 |  |  |  |  | 10 |
| CO3 |  | 10 |  | 16 |  |  | 26 |
| CO4 |  |  | 20 |  |  |  | 20 |
| CO5 | 4 | 22 |  | 14 |  |  | 40 |
| CO6 |  | 14 |  |  |  |  | 14 |
|  | | | | | | | **180** |



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| **Course Code** | **21AG3008** | **Duration** | **3hrs** |
| **Course Name** | **AGRONOMY OF MAJOR CEREALS AND PULSES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **Course Outcome** | **Bloom’s Level** | | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | | | | | |
| 1. | Tassel refers to the \_\_\_\_\_\_\_\_ flower of a corn plant. | | | CO1 | R | | 1 |
| 2. | \_\_\_\_\_\_\_\_ Protein in wheat is responsible for its the unique elasticity and stickiness, which makes it so useful in bread making. | | | CO6 | R | | 1 |
| 3. | \_\_\_\_\_\_\_\_ represent the female flower of maize. | | | CO1 | A | | 1 |
| 4. | The recommended dose of FYM /ha is \_\_\_\_\_\_\_\_ . | | | CO6 | A | | 1 |
| 5. | Wild oat is a major weed in \_\_\_\_\_\_\_\_\_ crop. | | | CO1 | R | | 1 |
| 6. | "Bio-control agents are compatible with bio-fertilizers". Is this statement correct or incorrect? | | | CO6 | R | | 1 |
| 7. | \_\_\_\_\_\_\_\_ Fertilizer applied to prevent root snapping problem in the paddy nursery while pulling out the paddy seedlings. | | | CO6 | A | | 1 |
| 8. | Which stage is the first indication for rice crop entering into reproductive state? | | | CO5 | R | | 1 |
| 9. | Carbendazim is used for \_\_\_\_\_\_\_\_ purpose. | | | CO2 | An | | 1 |
| 10. | Name the pulse crop which is remarked as a “WONDER CROP”, because of its high protein and oil contents. | | | CO1 | R | | 1 |
| 11. | \_\_\_\_\_\_\_\_ kg/ha is the recommended seed rate for SRI method of paddy cultivation. | | | CO3 | An | | 1 |
| 12. | CIMMYT is located in Mexico is known as \_\_\_\_\_\_\_\_\_\_\_\_ | | | CO1 | R | | 1 |
| 13. | \_\_\_\_\_\_\_\_ is considered as the primary centre of origin of maize. | | | CO3 | A | | 1 |
| 14. | *Eleusine coracana* is the botanical name for \_\_\_\_\_\_\_\_. | | | CO1 | R | | 1 |
| 15. | "Kabuli gram and Desi gram are nothing but our Bengal gram". Is this statement correct or incorrect? | | | CO6 | R | | 1 |
| 16. | \_\_\_\_\_\_\_\_ is the botanical name for Bengal gram or Chickpea. | | | CO6 | R | | 1 |
| 17. | Indian Institute of Soybean Research is located in \_\_\_\_\_\_\_\_. | | | CO6 | R | | 1 |
| 18. | \_\_\_\_\_\_\_\_ is the operation which is performed in low land paddy cultivation where ploughing is done in the flooded soil which mixes the soil and water to produce an impervious layer. | | | CO3 | R | | 1 |
| 19. | Name the process where the seeds are hydrated and then dried to their original moisture content to overcome the environmental stress in the field. | | | CO6 | U | | 1 |
| 20. | \_\_\_\_\_\_\_\_\_\_\_ crop is referred as the "Queen of Cereals". | | | CO1 | R | | 1 |
| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | | | | | |
| 21. | Briefly distinguish the characteristics of Indica, Japonica and Javanica sub species of rice. | | | CO1 | | R | 5 |
| 22. | What are the advantages in SRI method of paddy cultivation? | | | CO3 | | E | 5 |
| 23. | List down the economic importance of rice. | | | CO6 | | An | 5 |
| 24. | What is transgenic rice? Explain in detail about different transgenic rice varieties available. | | | CO 3 | | A | 5 |
| 25. | Elaborate about the management aspects of aged paddy seedlings, if used for transplanting in the main field. | | | CO6 | | A | 5 |
| 26. | Elaborate about the nutrient management in cultivating the irrigated maize. | | | CO5 | | A | 5 |
| 27. | Elaborate about the application of organic manures and Bio-fertilizers for cultivating transplanted puddled lowland rice. | | | CO3 | | R | 5 |
| 28. | Narrate about the constraints and challenges for wheat production in India. | | | CO2 | | E | 5 |
| 29. | List down the different types of maize and explain their characteristics. | | | CO1 | | R | 5 |
| 30. | Elaborate about the general seed treatment procedures which are followed for pulse crops by .using fungicides, biocontrol agents and biofertilizers. | | | CO4 | | U | 5 |
| 31. | Briefly explain about the nutritional values of sorghum. | | | CO1 | | R | 5 |
| 32. | Write in detail about the nursery preparation procedures for SRI method of paddy cultivation. | | | CO3 | | A | 5 |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | | | | |
| 33. | | a. | Explain in detail about the cultivation practices for Irrigated Maize from sowing to harvest? | CO3 | | A | 10 |
|  | | b. | Write briefly about the Nitrate poisoning in maize. | CO2 | | A | 5 |
| 34. | | a. | Explain in detail about the cultivation practices for wheat from sowing to harvest? | CO3 | | An | 10 |
|  | | b. | Elaborate about sorghum poisoning | CO6 | | An | 5 |
| 35. | | a. | Elaborate about the economic importance of Soybean and briefly describe about the crop's origin, distribution and cultivation practices in India. | CO1 | | E | 10 |
|  | | b. | Explain in detail about N management through LCC for paddy. | CO 3 | | A | 5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the geographical distribution, varietal improvements and the adaptability of major cereals and pulses cultivated in India. |
| CO2 | Acquire knowledge on crop production technologies for Rabi cereals. |
| CO3 | Perceive knowledge on crop production technologies for Kharif cereals. |
| CO4 | Manage the crop production technologies for Rabi pulses. |
| CO5 | Work out the crop production technologies for Kharif pulses. |
| CO6 | Apply the acquired knowledge to guide the farmers for cultivating cereals and pulses. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 21 |  | 1 |  | 10 |  | 32 |
| CO2 |  |  | 5 | 1 | 5 |  | 11 |
| CO3 | 6 |  | 26 | 11 | 5 |  | 48 |
| CO4 |  | 5 |  |  |  |  | 5 |
| CO5 | 1 |  | 5 |  |  |  | 6 |
| CO6 | 5 | 1 | 7 | 10 |  |  | 23 |
|  | | | | | | | **125** |