



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2013-2014

Discipline : Horticulture (*Pomology*)

Discipline Code : 13, *Sub code* : 02

Roll No.

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Please Note:

- (i) This question paper contains **12** pages. **Please check whether all the pages are printed in this set.** Report discrepancy, if any, **immediately** to the invigilator.
- (ii) **There shall be NEGATIVE marking for WRONG answers in the Multiple Choice type questions (No. 1 to 130) which carry one mark each. For every wrong answer 0.25 mark will be deducted.**

PART – I (General Agriculture)

Multiple choice questions (No. 1 to 30). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

1. Who is the present Chairman of Protection of Plant Varieties and Farmers' Right Authority (PPV&FRA)?
 - a) Dr. R.R. Hanchinal
 - b) Dr. P.L. Gautam
 - c) Dr. S. Nagarajan
 - d) Dr. Swapan K. Datta
2. Which among the following is another name for vitamin B₁₂?
 - a) Niacin
 - b) Pyridoxal phosphate
 - c) Cobalamin
 - d) Riboflavin
3. The largest share in India's farm export earning in the year 2011-12 was from
 - a) Basmati rice
 - b) Non-basmati rice
 - c) Sugar
 - d) Guar gum
4. The National Bureau of Agriculturally Important Insects was established by ICAR in _____, was earlier known as _____.
 - a) Bangalore; PDBC
 - b) New Delhi; National Pusa Collection
 - c) Ranchi; Indian Lac Research Institute
 - d) New Delhi; NCIPM
5. The most important sucking pests of cotton and rice are respectively
 - a) *Nilaparvata lugens* and *Aphis gossypii*
 - b) *Aphis gossypii* and *Thrips oryzae*
 - c) *Amrasca biguttula biguttula* and *Scirtothrips dorsalis*
 - d) *Thrips gossypii* and *Orseolia oryzae*
6. Which of the following microorganism causes fatal poisoning in canned fruits and vegetables?
 - a) *Aspergillus flavus*
 - b) *Penicillium digitatum*
 - c) *Clostridium botulinum*
 - d) *Rhizoctonia solani*
7. The cause of the great Bengal Famine was
 - a) Blast of rice
 - b) Brown spot of rice
 - c) Rust of wheat
 - d) Karnal bunt of wheat
8. Actinomycetes belong to
 - a) The fungi
 - b) Eukaryote
 - c) *Mycelia sterilia*
 - d) None of the above
9. A virus-free clone from a virus infected plant can be obtained by
 - a) Cotyledonary leaf culture
 - b) Axenic culture
 - c) Stem culture
 - d) Meristem tip culture
10. Which of the following is not an objective of the National Food Security Mission?
 - a) Sustainable increase in production of rice, wheat and pulses
 - b) Restoring soil fertility and productivity at individual farm level
 - c) Promoting use of bio-pesticides and organic fertilizers
 - d) Creation of employment opportunities

11. Agmarknet, a portal for the dissemination of agricultural marketing information, is a joint endeavour of
 - a) DMI and NIC
 - b) DMI and Ministry of Agriculture
 - c) NIC and Ministry of Agriculture
 - d) DMI and Directorate of Economics and Statistics
12. The share of agriculture and allied activities in India's GDP at constant prices in 2011-12 was
 - a) 14.1%
 - b) 14.7%
 - c) 15.6%
 - d) 17.0%
13. The average size of land holding in India according to Agricultural Census 2005-06 is
 - a) 0.38 ha
 - b) 1.23 ha
 - c) 1.49 ha
 - d) 1.70 ha
14. 'Farmers First' concept was proposed by
 - a) Paul Leagans
 - b) Neils Rolling
 - c) Robert Chamber
 - d) Indira Gandhi
15. In the year 2012, GM crops were cultivated in an area of
 - a) 150 million hectare in 18 countries
 - b) 170 million hectare in 28 countries
 - c) 200 million hectare in 18 countries
 - d) 1.70 million hectare in 28 countries
16. The broad-spectrum systematic herbicide glyphosate kills the weeds by inhibiting the biosynthesis of
 - a) Phenylalanine
 - b) Alanine
 - c) Glutamine
 - d) Cysteine
17. At harvest, the above ground straw (leaf, sheath and stem) weight and grain weight of paddy crop are 5.5 and 4.5 tonnes per hectare, respectively. What is the harvest index of paddy?
 - a) 45%
 - b) 50%
 - c) 55%
 - d) 100%
18. Crossing over between non-sister chromatids of homologous chromosomes takes place during
 - a) Leptotene
 - b) Pachytene
 - c) Diplotene
 - d) Zygotene
19. The term 'Heterosis' was coined by
 - a) G.H. Shull
 - b) W. Bateson
 - c) T.H. Morgan
 - d) E.M. East
20. When a transgenic plant is crossed with a non-transgenic, what would be the zygosity status of the F_1 plant?
 - a) Homozygous
 - b) Heterozygous
 - c) Hemizygous
 - d) Nullizygous
21. The highest per capita consumption of flowers in the world is in
 - a) The USA
 - b) India
 - c) Switzerland
 - d) The Netherlands
22. Which of the following is a very rich source of betalain pigment?
 - a) Radish
 - b) Beet root
 - c) Carrot
 - d) Red cabbage
23. Dog ridge is
 - a) Salt tolerant rootstocks of mango
 - b) Salt tolerant rootstocks of guava
 - c) Salt tolerant rootstocks of grape
 - d) Salt tolerant rootstocks of citrus
24. Which of the following micronutrients are most widely deficient in Indian soils?
 - a) Zinc and boron
 - b) Zinc and iron
 - c) Zinc and manganese
 - d) Zinc and copper
25. Which of the following fertilizers is not produced in India?
 - a) DAP
 - b) Urea
 - c) Muriate of potash
 - d) TSP
26. What is the estimated extent of salt affected soils in India?
 - a) 5.42 mha
 - b) 7.42 mha
 - c) 11.42 mha
 - d) 17.42 mha
27. Which of the following is not a feature of watershed?
 - a) Hydrological unit
 - b) Biophysical unit
 - c) Socio-economic unit
 - d) Production unit

28. Correlation coefficient 'r' lies between
 a) 0 and 1
 b) -1 and 1
 c) -1 and 0
 d) 0 and ∞
29. For the data 1, -2, 4, geometric mean is
 a) 2
 b) 4
 c) $-\frac{7}{3}$
 d) -2
30. The relationship between Arithmetic mean (A), Harmonic mean (H) and Geometric mean (G) is
 a) $G^2=AH$
 b) $G=\sqrt{A+H}$
 c) $H^2=GA$
 d) $A^2=GH$

PART – II (Subject Paper)

Multiple choice questions (No. 31 to 130). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

31. In pome fruit species, short shoots are named 'Dards' when they are
 a) Strictly vegetative
 b) Strictly floral
 c) Usually vegetative
 d) Usually floral
32. The sex form of the kiwifruit cultivar 'Hayward' is
 a) Staminate
 b) Pistillate
 c) Hermaphrodite
 d) Andromonoecious
33. The concept of effective pollination period (EPP) was developed by
 a) Janick
 b) Williams
 c) Frost
 d) Swingle
34. 1-Methylcyclopropene (1-MCP) is a competitive inhibitor of
 a) Ethylene
 b) ABA
 c) Jasmonic acid
 d) Salicylic acid
35. The most noticeable impact of climate change on mango trees in India is
 a) Heavy fruit drop
 b) Erratic flowering
 c) Greater incidence of mango malformation
 d) Bark splitting
36. Which among the following botanical families is also known as the 'Poison ivy' family?
 a) Juglandaceae
 b) Rosaceae
 c) Anacardiaceae
 d) Punicaceae
37. The florigenic promoter, which determines flowering in mango, is synthesized in
 a) Roots
 b) Apical buds
 c) Flower buds
 d) Leaves
38. In context of Australian mango germplasm, term 'Commons' refers to
 a) Introductions from South East Asia
 b) Frequently used parents in hybridization
 c) Kensington Pride and its clones
 d) Native mango germplasm
39. The top producer country of the grapes in world is
 a) China
 b) Italy
 c) United States
 d) Spain
40. Agri-Export Zones identified for pineapple are in the states of
 a) Tripura and West Bengal
 b) Tripura and Bihar
 c) Tripura and Sikkim
 d) Tripura and Andhra Pradesh
41. 'Flying Dragon', a dwarfing rootstock of citrus, is susceptible to
 a) Citrus tristeza
 b) *Phytophthora* root rot
 c) Citrus nematode
 d) Iron chlorosis
42. "Bangkok Golden Apple" is a variety of
 a) Guava
 b) Pineapple
 c) Avocado
 d) Pomegranate
43. International Institute of Tropical Agriculture is located in
 a) Kenya
 b) Ethiopia
 c) Nigeria
 d) Uganda

44. The somatic chromosome number (2n) of Illaichi cultivar of *ber* (*Zizyphus mauritiana*) is
- 12
 - 24
 - 48
 - 96
45. Richmond-Lang effect describes one of the basic properties of which plant growth regulator
- Jasmonic acid
 - Cytokinin
 - Ethylene
 - Abscisic acid
46. 'Chicken-tongue' seed formation in litchi is due to
- Parthenogenesis
 - Stenospermocarpy
 - Failure of pollination
 - Nutritional deficiency
47. The plant hormone playing a major role in the dormancy of fertilized ovary of *aonla* (*Emblca officinalis* Gaertn.) is
- Ethylene
 - Auxin
 - ABA
 - Gibberellin
48. Trifactor hypothesis, based on hormonal regulation, seeks to explain the flowering behaviour of
- Papaya
 - Litchi
 - Mango
 - Peach
49. "Fanleaf degeneration" a viral disease of grapes caused by *grapevine fan leaf virus* (GFLV), is transmitted by
- Flea beetle
 - Thrips
 - Nematode
 - Phylloxera
50. Which of the following sapota cultivar can produce both round and oval shaped fruits on the same tree?
- Cricket Ball
 - Kalipatti
 - Oval
 - Bhuripatti
51. The main photosynthetic product in apple is
- Sorbitol
 - Mannitol
 - Fructose
 - Sucrose
52. Light-induced reduction in the photosynthetic capacity of a plant is referred as
- Photolimitation
 - Photodestruction
 - Photoinhibition
 - Photodegradation
53. Deformed papaya fruits with bumpy skin surfaces are produced due to the deficiency of
- Boron
 - Calcium
 - Manganese
 - Potassium
54. What do you understand by "Fuji stain"?
- A storage disorder of Fuji apples
 - A new clone of Fuji apples
 - A promising somaclone of Fuji
 - An apple product
55. The life line tree of Thar desert is
- Phoenix dactylifera*
 - Zizyphus mauritiana*
 - Prosopis cineraria*
 - Withania somnifera*
56. Which fruit is known as the 'Grape of the Desert'?
- Salvadora oleoides*
 - Cordia myxa*
 - Capparis deciduas*
 - Opuntia ficus*
57. The first order sylleptic branches are usually formed in
- Zizyphus mauritiana*
 - Emblca officinalis*
 - Aegle marmelos*
 - Grewia subinaequalis*
58. The ideal host for expression of Hepatitis 'B' surface antigen (HBsAg) is
- Banana
 - Mango
 - Papaya
 - Guava
59. Taxon with only cultivated representation are known as
- Culton
 - Indigen
 - Landrace
 - Cultigen
60. The most suitable plant for biofencing is
- Ker*
 - Karonda*
 - Phalsa*
 - Khijri*

61. Which fruit is known as 'Cudappah almond'?
- Almond
 - Chirounjee
 - Pistachio nut
 - Filbert
62. Which flower is known as the 'Queen of East'?
- Dahalia
 - Gladiolus
 - Lilium
 - Chrysanthemum
63. Chilling sensitive apples are stored at
- 1 to 0°C
 - 1 to 2°C
 - 3 to 5°C
 - 8 to 10°C
64. Which pathogen is associated with 'Replant problem' in apple?
- Phytophthora sylvaticum*
 - Phytophthora infestans*
 - Phytophthora parasitica*
 - Phytophthora aphanidermatum*
65. Recently which mango variety has become popular in the eastern states of India?
- Rataul
 - Tommy Atkins
 - Amrapali
 - Pusa Arunima
66. Flattening of branches in sapota is caused by
- Fungus
 - Bacteria
 - Phytoplasma
 - Spiroplasma
67. Codling moth is a serious problem of apple in
- Kinnaur (Himachal Pradesh)
 - Kullu (Himachal Pradesh)
 - Leh (Jammu & Kashmir)
 - Srinagar (Jammu & Kashmir)
68. For harvesting Delicious apple at right maturity, the Starch Pattern Index (SPI) should be
- 2.5/10
 - 3.5/10
 - 4.5/10
 - 6.5/10
69. Which of the following is known as 'self-peeling banana'?
- Musa paterita*
 - Musa ingens*
 - Musa basjoo*
 - Musa velutina*
70. Which of the following grape varieties has strong Muscat flavour?
- Thompson Seedless
 - Bhokri
 - Cardinal
 - Pusa Seedless
71. In epicotyle grafting of mango, the age of rootstock is
- 30-35 days
 - 20-25 days
 - 10-15 days
 - 5-6 days
72. Wind break is effective upto a distance of (times) the height
- 2
 - 3
 - 4
 - 5
73. 'Suppressed climacteric' varieties are found in
- Apple
 - Banana
 - Plum
 - Peach
74. The moisture content of 'desiccated coconut' should be
- Less than 1%
 - Less than 3%
 - Less than 5%
 - Less than 6.5%
75. In which fruit crop, the bio-control agents were first time used for controlling post-harvest diseases?
- Mango
 - Strawberry
 - Banana
 - Apple
76. The moisture content of dried cashew nuts should be
- Nearly 2%
 - Nearly 5%
 - Nearly 8%
 - Nearly 12%
77. Which mango variety from Pakistan posed competition with Indian Alphonso in US markets during 2011?
- Langra
 - Chaunsa
 - Rataul
 - Aman Dashehari

78. The bergamot orange is a hybrid of
 a) *C. jambhiri* × *C. limonia*
 b) *C. volkameriana* × *C. sinensis*
 c) *C. aurantium* × *C. medica*
 d) *C. auratifolia* × *C. macrophylla*
79. Which of the following act as Nodal Agency to coordinate the efforts on Agri-Export Zones (AEZ) on the part of Central Government?
 a) APEDA
 b) NABARD
 c) ICAR
 d) NHB
80. The Ministry of Agriculture, Govt. of India had announced the year 2012 as the year of
 a) Floriculture
 b) Olericulture
 c) Horticulture
 d) Post-harvest management
81. A rare species of *Mangifera*, which is endemic to the Philippines
 a) *Mangifera merrillii*
 b) *Mangifera minutifolia*
 c) *Mangifera laurina*
 d) *Mangifera paludosa*
82. Ricey tissue disorder is found in
 a) Banana
 b) Apple
 c) Guava
 d) Mango
83. The only indigenous variety of apple grown in India has extraordinary keeping quality
 a) Ambri
 b) Sunehari
 c) Ambrika
 d) Swarnima
84. Yellow colour in onion is due to the pigment
 a) Carotene
 b) Quercetin
 c) Lycopene
 d) Anthocyanin
85. The range of correlation coefficient lies between
 a) 0 to 1
 b) -2 to +2
 c) -1 to +1
 d) 0 to 100
86. Which of the following Japanese grape varieties has largest berry size?
 a) Pione
 b) Kyoho
 c) Olympia
 d) Black Olympia
87. Which of the following grape varieties has non-acylated anthocyanin?
 a) Black Prince
 b) Pinot Noir
 c) Chardonnay
 d) Tempranillo
88. Which of the metal ion is associated with shift in colour pigments in grape?
 a) Al
 b) Mn
 c) Mg
 d) K
89. Seeds, which can tolerate loss of moisture and their longevity can be increased by storing at low temperature are called as
 a) Recalcitrant seeds
 b) Orthodox seeds
 c) Pure seeds
 d) Free seeds
90. True representative variety of *Vitis labrusca* is
 a) Bangalore Blue
 b) Concord
 c) Cheema Sahebi
 d) Thompson Seedless
91. Black sapota is botanically known as
 a) *Bassia longifolia*
 b) *Diospyrus digyra*
 c) *Manilkara zapota*
 d) *Achras zapota*
92. Doubling of chromosome may lead to
 a) Temporary suppression of self-incompatibility
 b) Elimination of self-incompatibility
 c) Embryo sac degeneration
 d) Increase in pollen fertility
93. Which group of cherimoya has acidic pulp with pineapple flavour?
 a) Finger-printed
 b) Tuberculated
 c) Mammilate
 d) Umbonate
94. 'Coulere' is a problem of
 a) Mango
 b) Mangosteen
 c) Grape
 d) Banana
95. Critical day and night temperatures, which inhibits anthocyanin formation in coloured grapes
 a) 28/26 °C
 b) 32/28 °C
 c) 35/30 °C
 d) 37/32 °C

96. Anthocyanin pigment in apple fruit is found in the form of
- Lycopene
 - Cyanidin-3-glucoside
 - β -carotene (Xanthophyll)
 - 5-dehydroshikimic acid
97. In tamarind, the leaflets fold after dark. This is attributed to
- Free tartaric acid
 - Free fatty acid
 - Lupeol
 - ADF bound nitrogen
98. Under which chapter of EXIM Policy 2001, the Concept of Agri-Export Zones (AEZ) has been introduced by Govt. of India?
- 15th
 - 16th
 - 17th
 - 18th
99. Daisy Seedless is a new release in
- Mandarin
 - Mango
 - Strawberry
 - Kiwifruit
100. Development of a branch with some intervening period of rest of lateral meristem and the branches is referred as
- Prolepsis
 - Syllepsis
 - Solasesis
 - Meollepsis
101. The tolerant rootstock for *Fusarium* wilt in *Passiflora* sp. is
- P. giberti*
 - P. duleis*
 - P. mollissima*
 - P. manicata*
102. The stage of inflorescence emergence in pineapple is known as
- Sorose
 - Piping
 - Rosette
 - Red heart
103. The first commercial self-fertile cultivar of sweet cherry is
- Lapin
 - Sweetheart
 - Comfort
 - Stella
104. In brinjal, the species which show resistance against *Phomopsis* blight and drought are
- S. khasianum* and *S. sisymbriifolium*
 - S. macrosperma* and *S. integrifolium*
 - S. melongena* and *S. torvum*
 - S. incanum* and *S. insamum*
105. 'Acid growth hypothesis' explains the mechanism of action of
- Auxins
 - Gibberellins
 - Cytokinin
 - Ethylene
106. 'Grape phylloxera' a worldwide problem of grapevine, is basically a/an
- Fungus
 - Virus
 - Nematode
 - Insect
107. The "black line" symptom in English walnut grafted onto rootstocks such as Paradox, a classical example of delayed incompatibility, is caused by
- Bacteria
 - Virus
 - Phytoplasma
 - Protozoa
108. In India, double pruning and double cropping systems in grape are followed in
- Temperate region
 - Hot tropical areas
 - Mild tropical areas
 - Sub-tropical region
109. National Phytotron Facility is located at
- Hyderabad
 - Chandigarh
 - New Delhi
 - Chennai
110. Which fruit crop is placed in the oxycoccus section of the genus *Vaccinium*?
- Raspberry
 - Strawberry
 - Cranberry
 - Goji berry
111. In mango hybridization programme, 'Bangalora' is not considered as a suitable parent because
- Hybrids possess prominent beak with poor quality fruit
 - Hybrids possess prominent beak with excellent fruit quality
 - Hybrids possess problem of spongy tissue
 - Hybrids possess susceptibility to malformation and anthracnose

112. Flowering in *aonla* occurs on which type of shoots?
- Determinate
 - Indeterminate
 - Apical
 - All of the above
113. The major problem in *phalsa* cultivation is considered to be
- Non-synchronized ripening
 - Susceptibility to foliar diseases
 - Self-incompatibility
 - Male sterility
114. Critical leaf/fruit ratio at which flower bud is not formed in Delicious apple is
- Below 5
 - Below 10
 - Below 25
 - Below 30
115. Cauliflorous type of fruit bearing is found in
- Jackfruit
 - Custard apple
 - Ber*
 - Apple
116. Dehaulming in potato is done
- Before planting
 - At the time of planting
 - Before harvesting
 - After harvesting
117. When used as a female parent in the hybridization programme, this variety of grape does not need emasculation
- Hur
 - Gold
 - Rubi Red
 - Anab-e-Shahi
118. An example of monoaxial fruit plant is
- Pomegranate
 - Cherry
 - Phalsa
 - Papaya
119. Which one of the following fruits was introduced in India for soil conservation purpose but later on it attained the status of a commercial fruit crop?
- Cashew nut
 - Sapota
 - Date palm
 - Areca nut
120. For an experiment in mango, a scientist took four doses of fertilizers, two methods of application with five replications. Suggest an appropriate experimental design for this experiment.
- Complete randomized block design
 - Latin square design
 - Factorial randomized block design
 - Split plot design
121. 'Albinism' a physiological disorder of fruit is generally observed in
- Grape
 - Strawberry
 - Plum
 - Guava
122. The Bombay Green variety of mango is also popularly known as
- Sylhet
 - Sarauli
 - Rataul
 - Tikari
123. Mulgoa variety of India was introduced in Florida during
- 1879
 - 1889
 - 1899
 - 1909
124. Grape variety resistant to powdery mildew
- Regale
 - Delaware
 - Chardonnay
 - Nistur
125. Enology is the study of
- Monument
 - Wines
 - Drying of horticultural produce
 - In-vitro* propagation
126. Photosynthetically active radiation wavelength range is
- 0.1 to 0.3 μm
 - 0.4 to 0.7 μm
 - 0.7 to 1.0 μm
 - 1.0 to 1.3 μm
127. Significance of difference among several means is tested with the help of
- χ^2 test
 - t-test
 - F-test
 - Z-test

128. A physiological disorder called 'Dry Neck' is common in
- Sapota
 - Mangosteen
 - Tree tomato
 - Avocado

129. Genome constitution of Safed Velchi banana is
- AA
 - AAA
 - ABB
 - AB

130. Hyper sensitive reaction indicates
- High disease susceptibility
 - True resistance
 - Tolerance
 - Escape

Matching type questions (No. 131 to 140); all questions carry equal marks. Choose the correct answer (a, b, c, d or e) for each sub-question (i, ii, iii, iv and v) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

131. Match the fruit crops with physiological disorders
- | | |
|------------------|------------------------------|
| i) Avocado | a) Premature fruit softening |
| ii) Sweet Cherry | b) Fruit drop |
| iii) Banana | c) Mesocarp discolouration |
| iv) Sapota | d) Rain cracking |
| v) Persimmon | e) Blue disease |

132. Match the micronutrient with their function
- | | |
|----------------|---------------------------|
| i) Boron | a) Chlorophyll synthesis |
| ii) Zinc | b) Urea hydrolysis |
| iii) Manganese | c) Pollen germination |
| iv) Nickel | d) Plastocyanin synthesis |
| v) Copper | e) Auxin synthesis |

133. Match the horticulturists and their area of research work
- | | |
|-------------------------|--------------------------|
| i) Jude Grosser | a) Somatic embryogenesis |
| ii) Uri Lavi | b) Transgenic papaya |
| iii) Silviero Sansavini | c) Somatic hybridization |
| iv) D. Gonsalves | d) Mango breeding |
| v) R.E. Litz | e) Fruit physiology |

- 134.
- | <u>Fruit</u> | <u>Synonym</u> |
|--------------------------------|---------------------|
| i) <i>Cordia myxa</i> | a) Christ's thorn |
| ii) <i>Garcinia mangostana</i> | b) Alligator pear |
| iii) <i>Carissa carandus</i> | c) Cherry of desert |
| iv) <i>Averrhoa carambola</i> | d) Queen of fruits |
| v) <i>Persea americana</i> | e) Star fruit |

- 135.
- | <u>Crop</u> | <u>Chromosome number</u> |
|-----------------------------|--------------------------|
| i) Manilla tamarind | a) $2n = 34$ |
| ii) <i>Aegle marmelos</i> | b) $2n = 18$ |
| iii) <i>Cydonia oblonga</i> | c) $2n = 26$ |
| iv) <i>Prunus armeniaca</i> | d) $2n = 22$ |
| v) <i>Psidium guajava</i> | e) $2n = 16$ |

- 136.
- | <u>Apple variety</u> | <u>Attributes</u> |
|----------------------|------------------------|
| i) Prima | a) Spur type |
| ii) Parlin's Beauty | b) Mutant of Delicious |
| iii) Red Chief | c) Indigenous variety |
| iv) Ambri | d) Low chilling type |
| v) Vance Delicious | e) Scab resistant |

- 137.
- | <u>Mango variety</u> | <u>Attributes</u> |
|----------------------|--------------------------------------|
| i) Pusa Shresth | a) Seedling of Haden |
| ii) Sindhu | b) Free from spongy tissue |
| iii) Arka Puneet | c) Elongated fruits with red peel |
| iv) Osteen | d) Thin stone with non-viable kernel |
| v) Neldica | e) Seedling of Palmer |

- 138.
- | <u>Common name</u> | <u>Botanical name</u> |
|------------------------|----------------------------------|
| i) Calamondin | a) <i>Citrus reshni</i> |
| ii) Cleopatra mandarin | b) <i>Citrus pennivesiculata</i> |
| iii) <i>Gajanimma</i> | c) <i>Citrus jambhiri</i> |
| iv) Rough lemon | d) <i>Citrus latifolia</i> |
| v) Tahiti lime | e) <i>Citrus madurensis</i> |

- 139.
- | <u>Resistant <i>Vitis</i> species</u> | <u>Diseases</u> |
|---------------------------------------|---|
| i) <i>V. aestivalis</i> | a) Downey mildew and black rot |
| ii) <i>V. vulpina</i> | b) Downey and powdery mildews |
| iii) <i>V. cinerea</i> | c) Downey mildew |
| iv) <i>V. labrusca</i> | d) Downey and powdery mildews and black rot |
| v) <i>V. smalliana</i> | e) Pierce's disease |

- 140.
- | <u>Fruit</u> | <u>Place of origin</u> |
|-----------------------|------------------------|
| i) Loquat | a) Sunda Island |
| ii) Pomegranate | b) Tropical America |
| iii) Fig | c) Turkey |
| iv) Mangosteen | d) China |
| v) Annonaceous fruits | e) Iran |

Short questions (No. 141 to 146); each question carries FIVE marks. Write answers, including computation / mathematical calculations if any, in the space provided for each question on the question paper itself.

141. "Limited supply of elite planting material is a major hurdle in the way of the development of Indian fruit industry". Critically examine this statement and give suggestions for overcoming the problem in question.

142. Enumerate the modern breeding objectives of mango and grape. Also enlist five important hybrids developed in mango and grape along with their parents.

143. Discuss how 'Horticultural Tourism' can become an important enterprise?

144. Fruit based diversified cropping system can impart economic stability to farmers? Justify, citing suitable examples.

145. Discuss about climate change impacts on fruit production and suggest adoption and mitigation strategies.

146. Discuss the basic principles of Design of Experiments.