



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2011-2012

Discipline : Horticulture (*Pomology*)

Discipline Code : 12, *Sub code* : 02

Roll No

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. Which of the following crops have been approved for commercial cultivation in India?
 - a) Bt cotton and Bt brinjal
 - b) Bt cotton and Golden Rice
 - c) Bt maize and Bt cotton
 - d) Bt cotton only
2. This year (2010-11) the expected food grain production in India is
 - a) 212 million tonnes
 - b) 220 million tonnes
 - c) 235 million tonnes
 - d) 250 million tonnes
3. The genome of which of the following crops is still not completely sequenced?
 - a) Rice
 - b) Soybean
 - c) Sorghum
 - d) Wheat
4. According to the Approach Paper to the 12th Five Year Plan, the basic objective of the 12th Plan is
 - a) Inclusive growth
 - b) Sustainable growth
 - c) Faster, more inclusive and sustainable growth
 - d) Inclusive and sustainable growth
5. To address the problems of sustainable and holistic development of rainfed areas, including appropriate farming and livelihood system approaches, the Government of India has set up the
 - a) National Rainfed Area Authority
 - b) National Watershed Development Project for Rainfed Areas
 - c) National Mission on Rainfed Areas
 - d) Command Area Development and Water Management Authority
6. Which of the following sub-schemes are not covered under the Rashtriya Krishi Vikas Yojana?
 - a) Extending the Green Revolution to eastern India
 - b) Development of 60,000 pulses and oilseeds villages in identified watersheds
 - c) National Mission on Saffron
 - d) National Mission on Bamboo
7. The minimum support price for the common variety of paddy announced by the Government of India for the year 2010-11 was
 - a) ₹ 1030
 - b) ₹ 1000
 - c) ₹ 980
 - d) ₹ 950
8. According to the Human Development Report 2010 of the United Nations, India's rank in terms of the human development index is
 - a) 119
 - b) 134
 - c) 169
 - d) 182

9. Which of the following does not apply to SRI method of paddy cultivation?
- Reduced water application
 - Reduced plant density
 - Increased application of chemical fertilizers
 - Reduced age of seedlings
10. Which organic acid, often used as a preservative, occurs naturally in cranberries, prunes, cinnamon and cloves?
- Citric acid
 - Benzoic acid
 - Tartaric acid
 - Lactic acid
11. Cotton belongs to the family
- Cruciferae
 - Anacardiaceae
 - Malvaceae
 - Solanaceae
12. Photoperiodism is
- Bending of shoot towards source of light
 - Effect of light/dark durations on physiological processes
 - Movement of chloroplast in cell in response to light
 - Effect of light on chlorophyll synthesis
13. Ergot disease is caused by which pathogen on which host?
- Claviceps purpurea* on rye
 - Puccinia recondita* on wheat
 - Drechlera sorokiniana* on wheat
 - Albugo candida* on mustard
14. Rocks are the chief sources of parent materials over which soils are developed. Granite, an important rock, is classified as
- Igneous rock
 - Metamorphic rock
 - Sedimentary rock
 - Hybrid rock
15. Which one of the following is a *Kharif* crop?
- Pearl millet
 - Lentil
 - Mustard
 - Wheat
16. The coefficient of variation (C.V.) is calculated by the formula
- $(\text{Mean}/\text{S.D.}) \times 100$
 - $(\text{S.D.}/\text{Mean}) \times 100$
 - $\text{S.D.}/\text{Mean}$
 - $\text{Mean}/\text{S.D.}$
17. Which of the following is commonly referred to as muriate of potash?
- Potassium nitrate
 - Potassium chloride
 - Potassium sulphate
 - Potassium silicate
18. Inbred lines that have same genetic constitution but differ only at one locus are called
- Multi lines
 - Monohybrid
 - Isogenic lines
 - Pure lines
19. For applying 100 kg of nitrogen, how much urea would one use?
- 45 kg
 - 111 kg
 - 222 kg
 - 333 kg
20. The devastating impact of plant disease on human suffering and survival was first realized by epidemic of
- Brown spot of rice in Bengal
 - Late blight of potato in USA
 - Late blight of potato in Europe
 - Rust of wheat in India
21. The species of rice (*Oryza*) other than *O. sativa* that is cultivated is
- O. rufipogon*
 - O. longisteminata*
 - O. glaberrima*
 - O. nivara*
22. The enzyme responsible for the fixation of CO_2 in mesophyll cells of C-4 plants is
- Malic enzyme
 - Phosphoenol pyruvate carboxylase
 - Phosphoenol pyruvate carboxykinase
 - RuBP carboxylase
23. Which one of the following is a 'Vertisol'?
- Black cotton soil
 - Red sandy loam soil
 - Sandy loam sodic soil
 - Submontane (Tarai) soil
24. What is the most visible physical characteristic of cells in metaphase?
- Elongated chromosomes
 - Nucleus visible but chromosomes not
 - Fragile double stranded loose chromosomes
 - Condensed paired chromosomes on the cell plate

25. All weather phenomena like rain, fog and mist occur in
- Troposphere
 - Mesosphere
 - Ionosphere
 - Ozonosphere
26. Which of the following elements is common to all proteins and nucleic acids?
- Sulphur
 - Magnesium
 - Nitrogen
 - Phosphorous
27. Silt has intermediate characteristics between
- Sand and loam
 - Clay and loam
 - Loam and gravel
 - Sand and clay
28. Certified seed is produced from
- Nucleus seed
 - Breeder seed
 - Foundation seed
 - Truthful seed
29. Seedless banana is an
- Autotriploid
 - Autotetraploid
 - Allotriploid
 - Allotetraploid
30. Which one of the following is used to test the goodness-of-fit of a distribution?
- Normal test
 - t-test
 - Chi-square test
 - F-test
33. Under Maharashtra conditions, fruit bud differentiation in grape takes place in the month of
- February
 - March
 - April
 - May
34. Fruitfulness in Thompson Seedless vines at light intensity of 3,600 ft candles at 35°C is required for
- 12 h
 - 14 h
 - 16 h
 - 18 h
35. Grape rootstock 1613 is a hybrid of
- V. champini* × *Othelo*
 - V. solonis* × *Othelo*
 - V. solonis* × *V. champini*
 - Othelo* × *V. soloni*
36. Which of the following genotypes is used as donor for nematode resistance in peach?
- Prunus ussuriensis*
 - Prunus davidiana*
 - Pyrus pashia*
 - Prunus griffithii*
37. Donor parent for cold hardiness in pear
- Pyrus pashia*
 - Pyrus khasiana*
 - Prunus ussuriensis*
 - Prunus davidiana*
38. In banana, the highest productivity has been reported as
- 13 t/ha
 - 23 t/ha
 - 43 t/ha
 - 63 t/ha
39. Moroccan datepalm cultivars have been shown to have somatic chromosome number of
- 24
 - 26
 - 32
 - 36
40. Bayoud disease in datepalm is caused due to
- Fusarium*
 - Pythium*
 - Sclerotinia*
 - Phytophthora*
41. Tetraploids in pineapple bear fruits which are
- Extra large
 - Large
 - Small
 - Elongated

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. According to Kostermans and Bompard (1993), the number of species of uncertain origin in genus *Mangifera* is
- 9
 - 11
 - 13
 - 15
32. The first mango introduction in America took place from
- Egypt
 - India
 - Cuba
 - Brazil

42. Black heart in pineapple appears when exposed to temperature
- <43°C
 - <20°C
 - <25°C
 - >25°C
43. Which of the following *Mangifera* species has only tetramerous flowers?
- M. altissima*
 - M. pentandra*
 - M. griffithii*
 - M. laurina*
44. Which of the following mango cultivar is monoembryonic?
- Kur
 - Madu
 - Florigon
 - Ono
45. The fibreless *Annona* sp.
- A. glabra*
 - A. muricata*
 - A. montana*
 - A. cherimola*
46. Which of the following species belongs to Muscadinia type?
- Vitis sylvestris*
 - Vitis popenoeii*
 - Vitis champini*
 - Vitis vulpina*
47. Grape Fan leaf virus is spread by
- Whitefly
 - Aphid
 - Bird
 - Nematode
48. 'Chicken tongue' refers to seedless fruit of
- Litchi
 - Avocado
 - Mangosteen
 - Durian
49. Bergamot is derived from the maternal cross of
- Citrus aurantium* × *Citrus medica*
 - Citrus aurantifolia* × *Citrus medica*
 - Citrus medica* × *Citrus aurantium*
 - Citrus medica* × *Citrus aurantifolia*
50. Which of the following is not a valid species of citrus?
- Citrus reticulata*
 - Citrus maxima*
 - Citrus medica*
 - Citrus latipes*
51. Which of the citrus genus is used as dye?
- Citropsis*
 - Citrus maxima*
 - Citrus medica*
 - Atalantia*
52. Which of the following is the native of Australia?
- Microcitrus*
 - Eremocitrus*
 - Clymenia*
 - Atalantia*
53. The constant factor for estimating heat unit is
- 7.5
 - 10.0
 - 12.5
 - 17.5
54. San Jose scale of apple was introduced in India from
- UK
 - USA
 - Canada
 - France
55. M 27 rootstock was evolved from the cross
- M 13 × M 7
 - M 13 × M 9
 - M 7 × M 13
 - M 9 × M 13
56. Cork spot in pear appears due to deficiency of
- Ca
 - B
 - Zn
 - K
57. Self-incompatibility in plum is governed by
- Single gene
 - Oligo gene
 - Polygene
 - Nuclear gene
58. The rootstock Paja of cherry is botanically known as
- Prunus gudouni*
 - Prunus fruticosa*
 - Prunus puddum*
 - Prunus cerasoides*
59. An ideal fruit crop for producing edible vaccine through genetic transformation
- Red banana
 - Pineapple
 - Papaya
 - Tree tomato

60. Which of the following fruit has maximum life on tree before ripening?
- Sapota
 - Aonla
 - Avocado
 - Mamey sapota
61. Which of the following is the third generation Floridan mango?
- Haden
 - Irwin
 - Zill
 - Ruby
62. Apart from Mulgoa, which is the other parent of the Floridan mango varieties?
- Carabao
 - Turpentine
 - Haden
 - Hindi
63. Which of the following strawberry varieties is known to be day neutral?
- Toiga
 - Sweet Charlie
 - Selva
 - Pajaro
64. Dichogamy is a rule in walnut but it is absent in
- Namdan
 - Sulaiman
 - Govind
 - Payne
65. Jaboticaba is the member of the family
- Moraceae
 - Euphorbiaceae
 - Myrtaceae
 - Guttiferae
66. The highest nut yielding cashew variety in India
- Ullal 2
 - Vengurla 2
 - Vengurla 5
 - Mridhula
67. Baby coconut is commercially known as
- Cocojal
 - Coco-nana
 - Coco-nino
 - Coco-cream
68. Sister seedling of Arka Kanchan grape
- Arka Trishna
 - Arka Soma
 - Arka Krishna
 - Arkavati
69. Which of the following is considered as satellite species?
- Key lime
 - Tahiti lime
 - C. latipes*
 - C. paradisi*
70. Novaria – a variety of banana has been developed using
- Polypoidy
 - In vitro* mutagenesis
 - Hybridization
 - Embryo rescue
71. In chestnuts, the following condition of pollination is noted
- Protogyny
 - Dichogamy
 - Duodichogamy
 - Protandry
72. In almonds, self-fertility is known to be
- Recessive
 - Dominant
 - Polygenic
 - Lethal
73. The group of plants where chlorophyll a : chlorophyll b ratio is highest
- C₃
 - C₄
 - CAM
 - Xerophyte
74. Which of the following do not have three different sex forms?
- Grape
 - Datepalm
 - Papaya
 - Strawberry
75. What is the critical temperature for flowering in pear?
- 4°C
 - 6°C
 - 8°C
 - 12°C
76. Parthenocarpic fruits in pear lack
- Colour
 - Smoothness
 - Size
 - Flavour
77. Which of the following light when exposed to plants leads to enhancement of gibberellic acid?
- Red
 - Far-red
 - Blue
 - UV

78. Photoblastic seed germination is observed in
a) Raspberry
b) Blue berry
c) Walnut
d) Peach
79. The deficiency symptom of sulphur first appears on
a) Young leaves
b) Older leaves
c) Shoot tip
d) Young fruits
80. Excess application of Zn leads to imbalance of
a) Mn + Fe
b) Fe + Cu
c) Mg + Cu
d) Mn + Cu
81. Indian strawberry *Fragaria vesca* L. has the ploidy level as
a) Diploid
b) Tetraploid
c) Octaploid
d) Decaploid
82. Pear decline caused by MLOs occur due to
a) Xylem blockage
b) Phloem blockage
c) Foot rot
d) Little leaf
83. Which of the following fruit crops is best suited for acidic soil?
a) *Jamun*
b) Citrus
c) Strawberry
d) *Phalsa*
84. Espalier system of training is similar to
a) Cordon
b) Telephone
c) Y system
d) Kniffin
85. Green berries in grape can be minimized with application of
a) Ethrel
b) Cycocel
c) NAA
d) β -NOA
86. Northern Spy apple is highly susceptible to
a) Water core
b) Russeting
c) Bitter pit
d) Woolly aphid
87. Apple *Chaubattia Agrim* has been evolved as
a) Selection
b) Mutant
c) Hybrid
d) Triploid
88. 'Endoxerosis' in citrus is caused due to disorder of
a) Nutrition
b) Moisture
c) Both a) and b)
d) Zn
89. Apart from grape early rain is also harmful in cultivation of
a) Strawberry
b) Pomegranate
c) Lemon
d) Datepalm
90. Protein content in cashewnut is
a) 22%
b) 24%
c) 26%
d) 28%
91. Which of the following is the nocturnal pest of citrus?
a) Citrus psylla
b) Fruit sucking moth
c) Aphids
d) Leaf miner
92. *Ficus glomerata* rootstock in fig is tolerant to
a) Acidic soil
b) Salinity
c) Nematode
d) Fe-toxicity
93. Rosaceous fruit crop which is rich in pectin
a) Peach
b) Pear
c) Quince
d) Apricot
94. *Feijoa sellowiana* was introduced in India from
a) Mexico
b) Brazil
c) Haiti
d) West Indies
95. Who is better known as 'Father of Systematic Pomology'?
a) De Candolle
b) Darwin
c) Lammark
d) Vavilov

96. The volatile compound present in banana after ripening
- Allylpropyl
 - Linalool
 - Diallylpropyl
 - Isopentanol
97. Largest producer of grape fruit
- Spain
 - USA
 - Japan
 - China
98. International Horticulture Congress-2010 of ISHS was held at
- Madrid
 - Lisbon
 - Kent
 - Paris
99. National Centre for Quality Control of Tissue Culture Raised Plant Material is located at
- IIHR, Bangalore
 - IARI, New Delhi
 - NRC Citrus, Nagpur
 - CPRI, Shimla
100. Bizzare orange – a graft chimera has been evolved as
- Sour orange and citron
 - Sweet orange and citron
 - Sweet orange and sour orange
 - Sour orange and grape fruit
101. Which of the following is the coloured sport of apple?
- Vareel
 - Liberty
 - Jonagold
 - Supreme
102. Denavelling is done in
- Papaya
 - Banana
 - Apple
 - Pineapple
103. Among temperate fruits, pruning intensity is most severe in
- Apple
 - Pear
 - Peach
 - Plum
104. Tall banana varieties take how many months for harvest from flowering?
- 6-7
 - 4-5
 - 3-4
 - 1-2
105. Genomic constitution of FHIA-1 is
- AAAA
 - ABBB
 - AAAB
 - ABB
106. Moko disease of banana is due to the attack of
- Fungus
 - Bacteria
 - Virus
 - MLOs
107. The parents of Tangelo citrus are
- Mandarin × Sweet orange
 - Mandarin × lemon
 - Mandarin × grape fruit
 - Mandarin × Sour orange
108. Genus *Psidium* contains about
- 50 spp.
 - 60 spp.
 - 80 spp.
 - 150 spp.
109. Food Product Order (FPO) was passed in the year
- 1950
 - 1953
 - 1955
 - 1960
110. *Trichoderma viride* is used to control
- Thrips
 - Powdery mildew
 - Damping off
 - Blight
111. Largest number of cultivated vegetables belongs to the family
- Cruciferae
 - Malvaceae
 - Fabaceae
 - Cucurbitaceae
112. Genetic male sterility is common in
- Rose
 - Marigold
 - Gladiolus
 - Dahlia
113. Ponds and Bridges are some important features of which garden?
- English
 - Mughul
 - Japanese
 - Italian

114. How much TPS (True Potato Seed) is required for planting one hectare?
- 20-25 g
 - 40-45 g
 - 70-75 g
 - 100-150 g
115. Bitterness in almond kernel is governed by
- Single dominant gene
 - Single recessive gene
 - Mutagens
 - Multiple genes
116. Which apple rootstock is resistant to fire blight infection?
- Robusta-5
 - Irish Peach
 - Northern Spy
 - Malus prunifolia*
117. Rind of citrus fruits become coarser and thicker due to deficiency of which element?
- Nitrogen
 - Zinc
 - Phosphorus
 - Magnesium
118. Ellagic acid which is naturally occurring phenolic constituent found in which fruit crop?
- Strawberry
 - Jackfruit
 - Walnut
 - Macadamia
119. Nomilin which inhibit the development of certain forms of cancer is present in which fruit crop?
- Grapefruit
 - Mango
 - Grape
 - Ber
120. Profiche is related to spring crop of which fruit crop?
- Fig
 - Longan
 - Persimmon
 - Avocado
121. Albedo in citrus fruit is rich in
- Protein
 - Oil
 - Cellulose
 - All of the above
122. Scientifically sand pear is called
- Pyrus serotina*
 - Pyrus communis*
 - Pyrus pyrifolia*
 - Pyrus cerasifera*
123. Tip layering is a natural method of propagation in which crop?
- Dewberry
 - Raspberry
 - Strawberry
 - None of the above
124. Pear decline is related to which of the following?
- Pear psylla
 - Nutrients deficiency
 - Pathogen attack
 - All of the above
125. Which is the flavouring ingredient of cherry juice?
- Methyl salicylate
 - Keracyanin
 - Cyanidin
 - None of the above
126. Which fruit is richest source of vitamin B₆?
- Almond
 - Guava
 - Blue berries
 - Walnut
127. Stooling method of guava multiplication was first reported in which year?
- 1945
 - 1954
 - 1958
 - 1984
128. Generic name cocos as well as popular name coconut is derived from Spanish word 'Coco' which means
- Monkey Tongue
 - Monkey Face
 - Monkey Hand
 - None of the above
129. Browning of cut pear fruit is due to
- Polyphenolase
 - Tannins
 - Phosphorus
 - None of the above
130. Which plum rootstock is drought tolerant?
- Myrobalan 2-7
 - Myrobalan 5-2
 - Marianna 2624
 - None of the above

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.

<u>Authority(ies)</u>	<u>No. of taxonomic species</u>
i) Hodgson	a) >100
ii) Tanaka	b) 16
iii) Singh and Nath	c) 17
iv) Swingle	d) 36
v) Bhattacharya and Dutta	e) 31

132.

i) Citrus psylla	a) <i>Metarrhizium anisopliae</i>
ii) Apple-European red mite	b) <i>Bacillus amyloliguifaci</i>
iii) Coconut rhinoceros beetle	c) <i>Tamarixia radiata</i>
iv) Bud rot of coconut	d) <i>Aspergillus niger</i>
v) Guava wilt	e) <i>Typhlodromous sp.</i>

133. Superior selections in grape

i) Sonaka	a) A.G. Meher
ii) Manik Chaman	b) L. Venkataratnam
iii) Monika	c) Nana Saheb Kale
iv) Dilkhush	d) R.S. Kadlag
v) Rao Sahebi	e) T.R. Dabade

134. Diseases and their casual organisms

i) Aonla ring rust	a) <i>Elsinoe sp.</i>
ii) Ber-black leaf spot	b) <i>Phaeophleospora sp.</i>
iii) Grape-anthraxnose	c) <i>Ravenelis sp.</i>
iv) Sapota-leaf spot	d) <i>Phytophthora sp.</i>
v) Cocoa-black pod	e) <i>Isariopsis sp.</i>

135.

<u>Crop</u>	<u>Chr. No.</u>
i) Pineapple	a) 18
ii) Datepalm	b) 50
iii) Aonla	c) 16
iv) Apple	d) 34
v) Almond	e) 36

136.

<u>Fruit</u>	<u>Variety</u>
i) Jackfruit	a) Dwarapudi
ii) Passion fruit	b) Singapore
iii) Sapota	c) Fire ball
iv) Loquat	d) Flavorcot
v) Apricot	e) Trellising

137.

<u>Fruit</u>	<u>Related term</u>
i) Peach	a) Bitter pit
ii) Almond	b) J.H. Hale
iii) Plum	c) Colt
iv) Apple	d) Pearless
v) Cherry	e) President

138.

<u>Fruit</u>	<u>Place of origin</u>
i) <i>Citrus paradisi</i>	a) East Asia
ii) <i>Citrus medica</i>	b) West Indies
iii) <i>Citrus limon</i>	c) China
iv) <i>Citrus sinensis</i>	d) South East Asia
v) <i>Citrus grandis</i>	e) India

139.

<u>Family</u>	<u>Scientific name</u>
i) Fabaceae	a) <i>Physalis peruviana</i> L.
ii) Combretaceae	b) <i>Persea americana</i> M.
iii) Solanaceae	c) <i>Terminalia catappa</i> L.
iv) Lauraceae	d) <i>Nephelium lappaceum</i> L.
v) Spindaceae	e) <i>Tamarindus indica</i> L.

140.

<u>Fruit</u>	<u>Synonym</u>
i) Guava	a) Elephant apple
ii) Banana	b) Star apple
iii) Wood apple	c) Apple of tropics
iv) Phalsa	d) Apple of paradise
v) Jamun	e) Black plum

13.0
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. Justify why Amrapali mango is a boon for both breeders and fruit growers?

142. Breeding of perennial fruit trees is a long drawn process. Suggest strategies for shortening the breeding cycle and enhancing precision in crop improvement.

143. What is a synthetic seed? Explain the production technique and its uses in fruit crops.

144. What are the reasons for decline in area under sub-tropical grapes in India? Suggest strategies to improve it.

145. 'Sloh' - a hybrid of peach and almond is used as a parent in almond improvement programme, why?

146. In alkaline soils, guava cultivation is not recommended. Why? Enumerate the technique of meadow orcharding in guava.