



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

Discipline : Horticulture (*Floriculture*)

Discipline Code : 12; *Sub code* : 01

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.

- Which of the following crops have been approved for commercial cultivation in India?
 - Bt cotton and Bt brinjal
 - Bt cotton and Golden Rice
 - Bt maize and Bt cotton
 - Bt cotton only
- This year (2010-11) the expected food grain production in India is
 - 212 million tonnes
 - 220 million tonnes
 - 235 million tonnes
 - 250 million tonnes
- The genome of which of the following crops is still not completely sequenced?
 - Rice
 - Soybean
 - Sorghum
 - Wheat
- According to the Approach Paper to the 12th Five Year Plan, the basic objective of the 12th Plan is
 - Inclusive growth
 - Sustainable growth
 - Faster, more inclusive and sustainable growth
 - Inclusive and sustainable growth
- 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
 - National Rainfed Area Authority
 - National Watershed Development Project for Rainfed Areas
 - National Mission on Rainfed Areas
 - Command Area Development and Water Management Authority
- Which of the following sub-schemes are not covered under the Rashtriya Krishi Vikas Yojana?
 - Extending the Green Revolution to eastern India
 - Development of 60,000 pulses and oilseeds villages in identified watersheds
 - National Mission on Saffron
 - National Mission on Bamboo
- The minimum support price for the common variety of paddy announced by the Government of India for the year 2010-11 was
 - ₹ 1030
 - ₹ 1000
 - ₹ 980
 - ₹ 950
- According to the Human Development Report 2010 of the United Nations, India's rank in terms of the human development index is
 - 119
 - 134
 - 169
 - 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. rufipugon*
 - 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
 a) Troposphere
 b) Mesosphere
 c) Ionosphere
 d) Ozonosphere
26. Which of the following elements is common to all proteins and nucleic acids?
 a) Sulphur
 b) Magnesium
 c) Nitrogen
 d) Phosphorous
27. Silt has intermediate characteristics between
 a) Sand and loam
 b) Clay and loam
 c) Loam and gravel
 d) Sand and clay
28. Certified seed is produced from
 a) Nucleus seed
 b) Breeder seed
 c) Foundation seed
 d) Truthful seed
29. Seedless banana is an
 a) Autotriploid
 b) Autotetraploid
 c) Allotriploid
 d) Allotetraploid
30. Which one of the following is used to test the goodness-of-fit of a distribution?
 a) Normal test
 b) t-test
 c) Chi-square test
 d) F-test
33. Snapdragon is a native of
 a) Southern Europe
 b) Asia
 c) Western Europe
 d) Mexico
34. Which of the following is intangible item?
 a) Rock Boulder
 b) Sound of waterfall
 c) Water
 d) Animal
35. The term "bonsai" was popularized by
 a) Korean
 b) Chinese
 c) Japanese
 d) American
36. Which of the following species of *Jasminum* is used for perfume?
 a) *sambac*
 b) *grandiflorum*
 c) *multiflorum*
 d) *flexile*
37. Perlite is
 a) Mica dust
 b) Organic matter from sea
 c) Volcanic rock
 d) Wood shaving
38. Precursor for ethylene production is
 a) Arginine
 b) Tryptophan
 c) Methionine
 d) Glutamine
39. Most of the companies exporting dry flowers are situated at
 a) Tuticorin
 b) Goa
 c) Bangalore
 d) Shimla

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. The breeding method used for self-pollinated crops is
 a) Mass selection
 b) Pure line selection
 c) Clonal selection
 d) Introduction
32. Art of training plants into shape of different statues, birds or animals is known as
 a) Edge
 b) Topiary
 c) Hedge
 d) Pergola
40. Mizoram state is famous for growing
 a) Bird of Paradise
 b) Rhododendron
 c) Anthurium
 d) Ornamental Banana
41. Grey mould in chrysanthemum is caused by
 a) *Fusarium*
 b) *Botrytis*
 c) *Alternaria*
 d) *Septoria*
42. Gulkand is prepared by mixing rose petals and sugars in ratio of
 a) 1:1
 b) 1:2
 c) 1:3
 d) 2:1

43. Modern day garden variety of chrysanthemum belong to
a) *C. morifolium*
b) *C. indicum*
c) *C. japonicum*
d) *C. boreale*
44. The students t-test was discovered by
a) Karl Pearson
b) S.D. Passion
c) W.S. Gosset
d) James Bernoulli
45. Fruit of rose is known as
a) Bulbs
b) Hips
c) Caropsis
d) Berry
46. The quickest method of laying a lawn is
a) Seedling
b) Turfing
c) Dibbling
d) Dung plastering
47. Mean, median and mode is equal in
a) Normal distribution
b) Binomial distribution
c) Poisson distribution
d) Chi-square
48. Arka Ambara and Arka Kanaka are hybrids of
a) *Crossandra*
b) *Gaillardia*
c) *Jasmine*
d) *Tuberose*
49. Correlation coefficient lies between
a) 0 – 1
b) 1
c) -1 to +1
d) 0 – 1.5
50. Cryopreservation is associated with
a) Liquid nitrogen
b) Liquid oxygen
c) Liquid potassium
d) Liquid carbon dioxide
51. Cytoplasmic male sterility is found in
a) *Salvia*
b) *Antirrhinum*
c) *Ageratum*
d) *Petunia*
52. Canna is also known as
a) Spanish day
b) African lily
c) Indian shot
d) Century plant
53. Cascade is a style of
a) Topiary
b) Ikebana
c) Bonsai
d) Pergola
54. CO₂ concentration required for rose growing in greenhouse should be
a) Upto 300 ppm
b) 700-800 ppm
c) 1000-3000 ppm
d) Above 3000 ppm
55. The Rashtrapati Garden is example of which type of gardens?
a) Mughal
b) Japanese
c) English
d) Italian
56. Tissue culture is common in
a) Rose
b) Orchids
c) *Gladiolus*
d) Palms
57. Which of the following is a summer annual?
a) *Nustritium*
b) *Sweet Alysum*
c) *Kochia*
d) *Sweet Sultan*
58. The botanical name of *Amaltas* is
a) *Bahunia purpurata*
b) *Cassia fistula*
c) *Cassia siamea*
d) *Cassia marginata*
59. Which of the following flowers does not bloom throughout the year, i.e., season-specific?
a) *Chrysanthemum*
b) *Delphiniums*
c) *Gerberas*
d) *Carnations*
60. Which of the following cole crops contain highest amount of vitamin A?
a) *Brussels sprout*
b) *Knol Khol*
c) *Sprouting broccoli*
d) *Cauliflower*
61. Photo insensitive variety of chrysanthemum is
a) *Pusa Centenary*
b) *Pusa Arpita*
c) *Pusa Anmol*
d) *Pusa Kiran*

62. What does RHS stand for?
a) Romanian Horticultural Society
b) Romanian Horticultural School
c) Royal Horticultural Society
d) Royal Horticultural School
63. A series of arches is known as
a) Pergola
b) Arch
c) Terrace
d) Topiary
64. Carnation belongs to the botanical family
a) Iridaceae
b) Gesneriaceae
c) Caryophyllaceae
d) Liliaceae
65. *Begonia semperflorens* is propagated by
a) Stem cuttings
b) Leaf cuttings
c) Seed
d) Rhizomes
66. *Alstonia scholaris* is commonly known as
a) Devils tree
b) Bread tree
c) Angel tree
d) Umbrella tree
67. Deepika is a variety of
a) Zinnia
b) Balsam
c) Hollyhock
d) Rose
68. Which of the following treatments do you recommend to ensure good germination of rose seeds?
a) Acid scarification
b) Stratification
c) Both acid scarification and stratification
d) Sulphitation
69. To avoid continuous shade of certain portion of a multispan greenhouse, the most ideal orientation is
a) East-West
b) North-South
c) South-East
d) North-East
70. Terrarium is an art of growing plants
a) In terraces
b) In water
c) In rocks
d) In glass container
71. International Registration Authority of Bougainvillea is located at
a) The Netherlands
b) New Delhi
c) China
d) Thailand
72. Dried rose petals are known as
a) Gul Roghan
b) Gulkand
c) Pankhuri
d) Hips
73. Plant hormone that induces morphogenesis in plant tissue culture is
a) Abscisic acid
b) Cytokinin
c) Ethylene
d) Gibberellins
74. Wazid Ali Shah is a variety of
a) Barleria
b) Rose
c) Bougainvillea
d) Chrysanthemum
75. Swami Vinayananda of R.K. Math has done pioneer work in
a) Rose
b) Dahlia
c) Bougainvillea
d) Chrysanthemum
76. Crocus is propagated by
a) Tuber
b) Corm
c) Bulb
d) Rhizome
77. *Rosa wichuriana* is a
a) Tetraploid
b) Diploid
c) Triploid
d) Aneuploid
78. Which of the following shrubs have coppery leaves?
a) *Hamelia patens*
b) *Euphorbia splendens*
c) *Euphorbia cotinifolius*
d) *Nerium oleander*
79. Which is scented hedge?
a) Poinsettia
b) Aclipha
c) Hibiscus
d) Murraya

80. Double flowers and climbing habit in rose are governed by
- Single recessive genes
 - Poly genes
 - Single dominant genes
 - Additive genes
81. Rocket is a F1 hybrid with long spike in
- Gladiolus
 - Petunia
 - Antirrhinum
 - Viola
82. Pseudo bulbs of *Dendrobium tokai* are used as
- Dermatological application
 - Ornamental purpose
 - Oral contraceptive
 - Starch
83. Calla lily belongs to family
- Araceae
 - Iridaceae
 - Musaceae
 - Acanthaceae
84. In American system of classification of gladiolus, the first digit represents
- Floret size
 - Floret colour
 - Spike size
 - Floret shade
85. Example of monopodial orchids
- Vanda and Angraecum
 - Vanda and Cattleya
 - Cattleya and Epidendrum
 - Vanda and Epidendrum
86. Grass suitable for shady place is
- Cynodon dactylon*
 - Poa memorialis*
 - Zoysia japonica*
 - None of the above
87. Hanging garden, a seven wonder located at
- Vatican City
 - New Delhi
 - Babylonia
 - Moscow
88. Single type varieties of tuberose are
- Prajwal and Phule Rajani
 - Prajwal and Shringar
 - Suvasini and Shringar
 - Phule Rajani and Shringar
89. Glycocides are extracted from
- Corn flower
 - Sweet Sultan
 - Solidago
 - Gypsophylla
90. The person associated with French garden is
- Lloyd
 - Le Carbusure
 - Le Notre
 - Luteyns
91. The thickness of covering material in polyhouse should be
- 100 μ micron
 - 150 μ micron
 - 200 μ micron
 - 300 μ micron
92. Which of the following is not included in Japanese garden?
- Tea
 - Hill garden
 - Flat garden
 - Vertical garden
93. Repetition of same object at equidistance in landscape is called
- Design
 - Rhythm
 - Focal point
 - Layout
94. Geotropical bending is not found in
- Gladiolus
 - Antirrhinum
 - Lupin
 - Lily
95. Most common and problematic weed of lawn is
- Cyprus rotundus*
 - Joysia japonica*
 - Parthenium*
 - Oxalis* sps.
96. Fancy grade of gladiolus spikes should have
- 25 florets (minimum)
 - 16 florets (minimum)
 - 14 florets (minimum)
 - 12 florets (minimum)
97. Spider flower type in chrysanthemum and gerbera often controlled by
- Polygenic
 - Monogenic
 - Recessive dominant
 - Additive
98. First Islamic garden in India was developed by
- Ferozshah
 - Jehangir
 - Akbar
 - Babar

99. Reaction time in chrysanthemum refers to
- Necessary number of day-night cycles for induction or sufficient flower quality
 - Necessary number of day-night cycles for induction or sufficient vegetative growth
 - Necessary number of long day cycles for induction or sufficient flower quality
 - Necessary number of long day cycles for induction or sufficient vegetative growth
100. The basic chromosome number in *Dianthus* is
- 12
 - 13
 - 14
 - 15
101. Which is the common method of propagation in *Dahlia* for taking large sized flowers?
- Cuttings
 - Seeds
 - Budding
 - Grafting
102. Hand emasculation in Pansy is eliminated by presence of
- Hercogamy
 - Protandry
 - Protogyny
 - Cytoplasmic male sterility
103. For preparing 600 ppm solution of NAA, how much quantity of the chemical is to be dissolved in one litre of water?
- 6 gm
 - 6 mg
 - 600 mg
 - 6000 mg
104. Aneuploids are very common in
- Marigold
 - Chrysanthemum
 - Tuberose
 - Crossandra
105. *Alpinia zerumbet*, which bears beautiful flowers and is commonly called as
- Shell Ginger
 - Red Ginger
 - Queens Candle
 - Torch Ginger
106. Lipstick is a variety of
- Carnation
 - Red Ginger
 - Gerbera
 - Heliconia
107. The origin of Balsam is
- China
 - India
 - Japan
 - Nepal
108. Saffron is obtained from
- Roots
 - Styles tips
 - Leaves
 - Stem
109. Genetic engineering for flower structure modification can be brought out by tinkering which group of genes?
- SAG 1 gene
 - VUNCED 1 gene
 - MADS-box genes
 - ERs gene
110. Which of the following pigments extracted from marigold is widely used in food and poultry industry?
- Chlorophyll
 - Anthocyanin
 - Carotenoids
 - Delphinidin
111. The distinguishing feature of Cacti is the presence of
- Spathe spadix
 - Hydathodes and spises
 - Velamen and tapals
 - Glochids and aereoles
112. High auxin:cytokinin ratio in *in-vitro* cultures favours the
- Shoot formation
 - Root formation
 - Flower bud formation
 - Embryo formation
113. Yellow is a serious disease in
- Stock
 - Marigold
 - Gladiolus
 - China aster
114. Change in one variable accompanied by change in another variable and then having a definite relation between the two is called
- Correlation
 - Covariance
 - Correlation coefficient
 - Regression coefficient
115. The genus *Gerbera* was named in honour of
- Greek naturalist
 - French naturalist
 - German naturalist
 - Russian naturalist

116. The first botanical garden in the world was made during 16th century at
- Paua (Italy)
 - Kyato (Japan)
 - Singapore
 - San Francisco (USA)
117. Epinasty in poinsettia is due to
- Ethylene
 - Gibberellin
 - Maleic hydrazide
 - Aluminium sulphate
118. Gladiolus fruit is a
- Berry
 - Capsule
 - Pod
 - Drupe.
119. Doubleness in *Mathiola incana* is governed by
- Multiple dominant gene
 - Single dominant gene
 - Single recessive gene
 - Double recessive gene
120. Which is national flower of South Africa?
- Chrysanthemum
 - Bird of Paradise
 - Protea
 - Gladiolus
121. Stenting is practiced in
- Dahlia
 - Ficus
 - Rose
 - Ranunculus
122. Discolouration of the spathe in anthurium is associated with deficiency of
- Boron
 - Zinc
 - Phosphorus
 - Calcium
123. In plant families like Nyctaginaceae and Cactaceae, colours are caused by
- Flavonoids
 - Betalins
 - Carotenoids
 - Anthocyanins
124. Gladiolus in hill is planted during
- February-March
 - March-April
 - May-June
 - September-October
125. Intergeneric crosses have been commercially exploited in
- Gladiolus
 - Orchids
 - Gerbera
 - Dahlia
126. Bud pollination is an effective method for producing
- Homozygous self-compatible lines
 - Homozygous self-incompatible lines
 - Intergeneric crosses
 - Interspecific crosses
127. Variegated chrysanthemum variety is
- Niharika
 - Swarna Rekha
 - Appu
 - Preet Singar
128. *Aphelenchoids besseyi* which attacks tuberose is a
- Eelworm
 - Vascular arbuscular mycorrhiza
 - Foliar nematode
 - Root-knot nematode
129. Fertility Index is
- $\frac{\text{Number of seeds produced}}{\text{Number of flowers pollinated}}$
 - $\frac{\text{Number of flowers produced}}{\text{Number of seeds pollinated}}$
 - $\frac{\text{Number of seeds produced}}{\text{Number of flower produced}}$
 - $\frac{\text{Number of seeds produced}}{\text{Number of flowers pollinated}} \times 100$
130. Translocation of Auxin is
- Basipetal
 - Acropetal
 - Lateral
 - Transverse

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.

- | | |
|---------------------------|--------------|
| i) Male sterility | a) Impatiens |
| ii) Heterostyli | b) Primula |
| iii) Self-incompatibility | c) Ageratum |
| iv) Monoecy | d) Begonia |
| v) Hercogamy | e) Viola |

132.

- | | |
|--------------------|--------------|
| i) Gladiolus | a) Cuttings |
| ii) Kochia | b) Bulbil |
| iii) Chrysanthemum | c) Corm |
| iv) Rose | d) Annual |
| v) Tiger lily | e) T-budding |

133.

- | | |
|----------------|----------------|
| i) 2-4 D | a) Vitamin |
| ii) Auxin | b) Fungicide |
| iii) Malathion | c) PGR |
| iv) Thiram | d) Weedicide |
| v) Riboflavin | e) Insecticide |

134.

- | | |
|--------------------------------------|-------------------------------|
| i) Summer flowering yellow tree | a) <i>Erythrian indica</i> |
| ii) Xerophytic yellow flowering tree | b) <i>Cassia siamea</i> |
| iii) Tree for lakes or ponds | c) <i>Cassia fistula</i> |
| iv) Tree for road side | d) <i>Soilia babylonica</i> |
| v) Tree for red flowers | e) <i>Pakinsonia aculeata</i> |

135.

- | | |
|---------------------|------------------|
| i) Sword lily | a) Alstromeria |
| ii) Incus lily | b) Chrysanthemum |
| iii) Belladona lily | c) Gladiolus |
| iv) African daisy | d) Amaryllis |
| v) Autumn queen | e) Gerbera |

136.

- | | |
|---------------------|-------------------------------------|
| i) Tall Palm | a) <i>Phoenix sylvestris</i> Roxb |
| ii) Fish Tail Palm | b) <i>Roystonea regia</i> Cook |
| iii) Betel Nut Palm | c) <i>Caryota urens</i> Linn |
| iv) Mountain Glory | d) <i>Borassus flabellifer</i> Linn |
| v) Wild Date Palm | e) <i>Areca catechu</i> Linn |

137.

Basic chromosome number

- | | |
|------------------|-------|
| i) Rosa | a) 13 |
| ii) Gladiolus | b) 15 |
| iii) Antirrhinum | c) 07 |
| iv) Jasminum | d) 30 |
| v) Polianthus | e) 08 |

138.

- | | |
|------------------|-------------------------------------|
| i) Downey mildew | a) <i>Agrobacterium tumefaciens</i> |
| ii) Crown gall | b) <i>Macrosiphoniella sanborni</i> |
| iii) Rust | c) <i>Achatia fullica</i> |
| iv) Aphids | d) <i>Pharagmidium</i> spp. |
| v) Snail | e) <i>Pernospora sparsa</i> |

139.

- | | |
|--------------------------|--|
| i) Standard carnation | a) When buds exhibit half colour |
| ii) Tulip | b) Outer row of flowers show pollen |
| iii) Spray chrysanthemum | c) When buds exhibits colour |
| iv) Gerbera | d) Half open flowers (paint brush stage) |
| v) Lilium | e) Fully open flowers |

140.

- | | |
|-----------------------|----------------------|
| i) Bt gene | a) Viral resistance |
| ii) Coat protein gene | b) Male sterility |
| iii) Chitinase gene | c) Stress resistance |
| iv) Barnase gene | d) Insect resistance |
| v) Prolamine gene | e) Fungal resistance |

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. Growth regulators considerably affect vase life of flowers – discuss the statement with three examples.

142. Discuss the advantage of polyploidy breeding in ornamentals, citing two examples.

143. Marigold is a versatile crop. Justify the statement.

144. Suggest avenues for diversification in floriculture. Discuss cut foliage with suitable examples.

145. What are the advantages of off-season flowering? How do you address off-season flowering in chrysanthemum?

146. How physiological disorders affect the flower crops? Discuss briefly taking rose and carnation as example.